

CATALOGUE OF MACHINERY

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THE OLDEST MACHINE MAKERS IN THE TRADE.

PATENTEES AND MAKERS

OF

MACHINERY

On the Latest and Most Approved Principles,

FOR

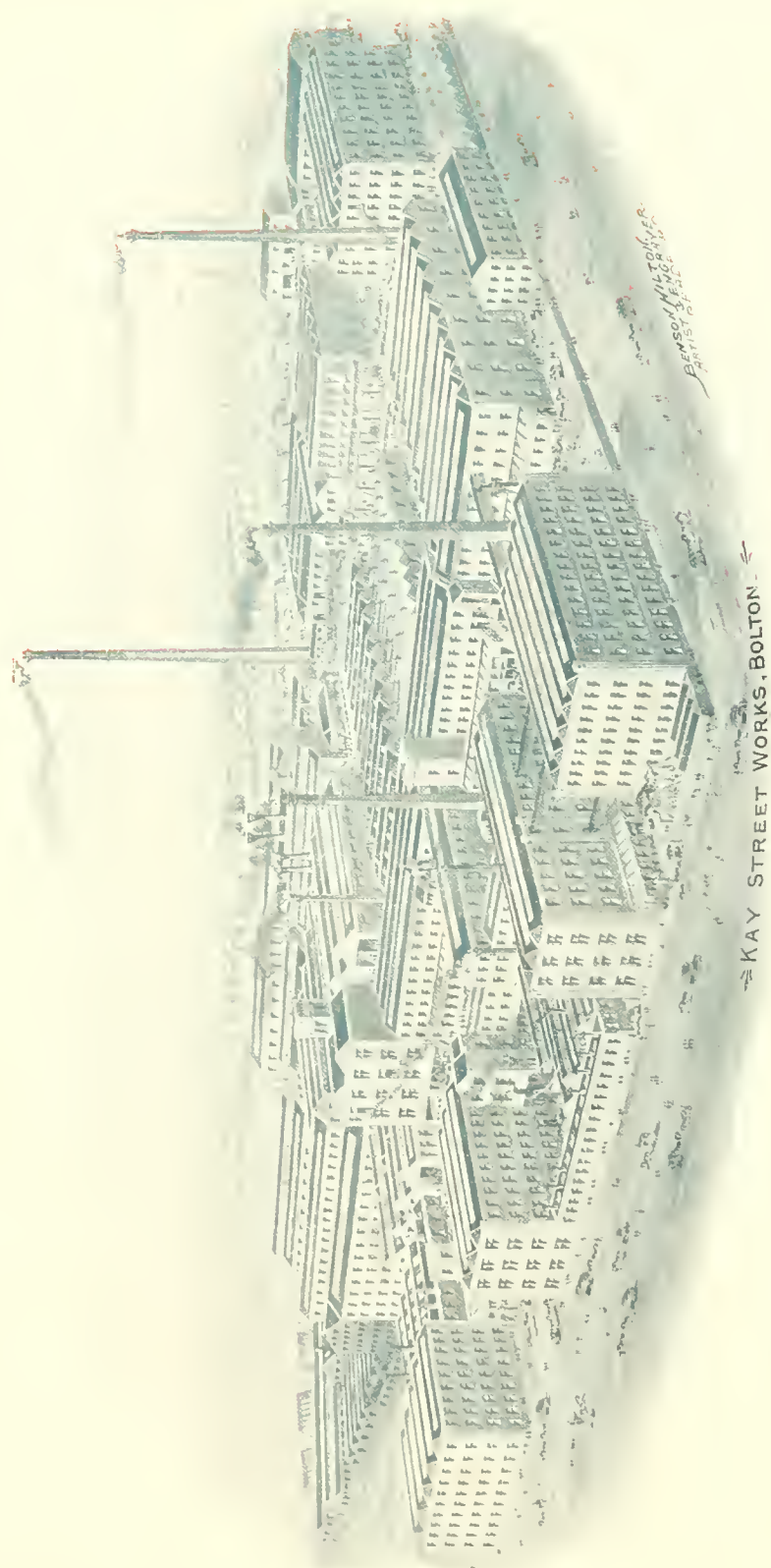
PREPARING, SPINNING & DOUBLING

COTTON, COTTON WASTE, WOOL, WORSTED,
SILK, AND VIGONIA YARNS.

KAY STREET WORKS, BOLTON, Eng.

WB 860

TS 1525
D4

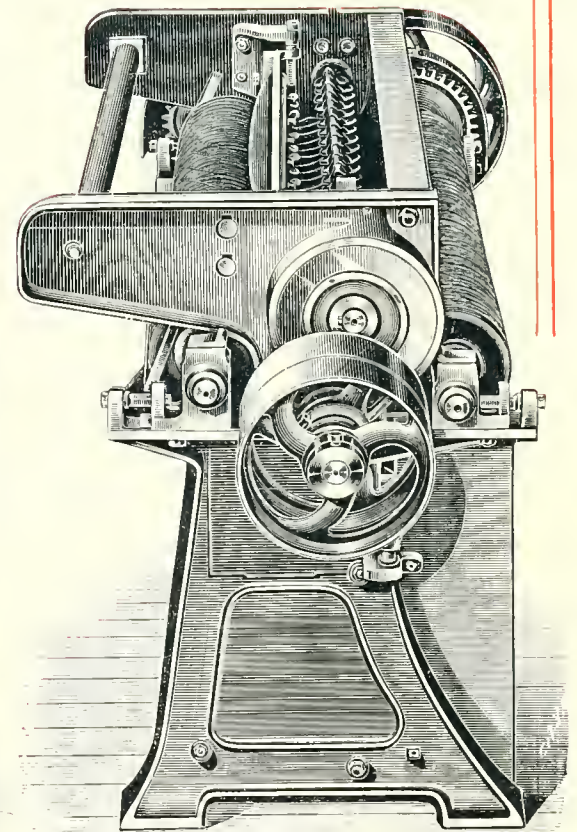
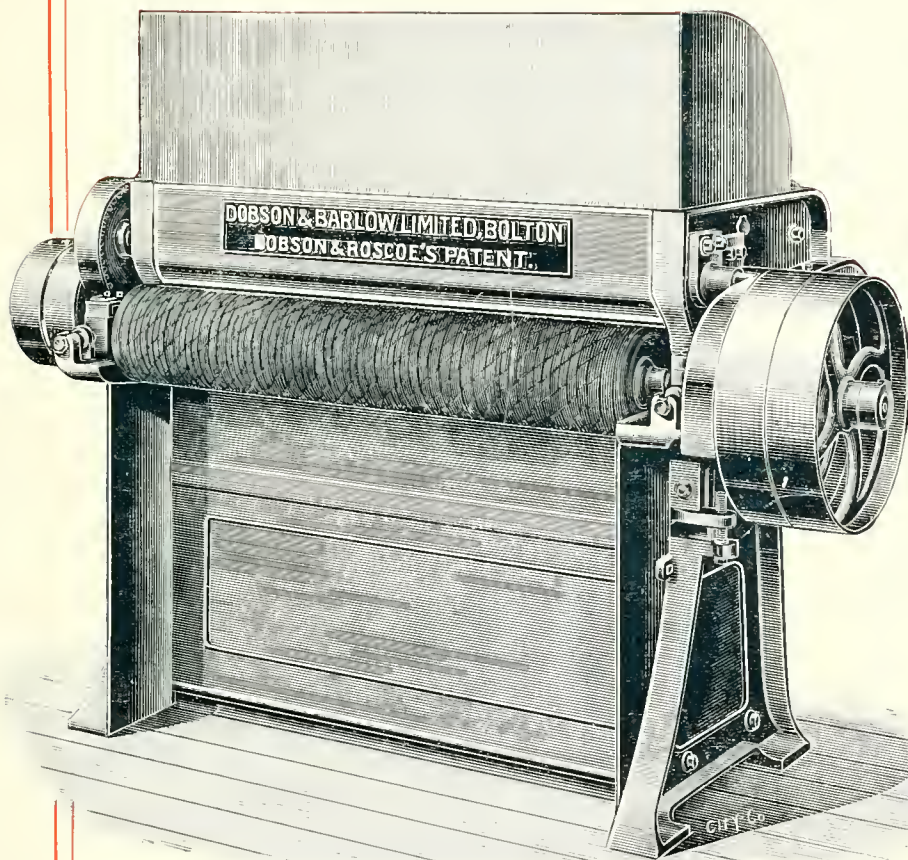


KAY STREET WORKS, BOLTON

1525
D4

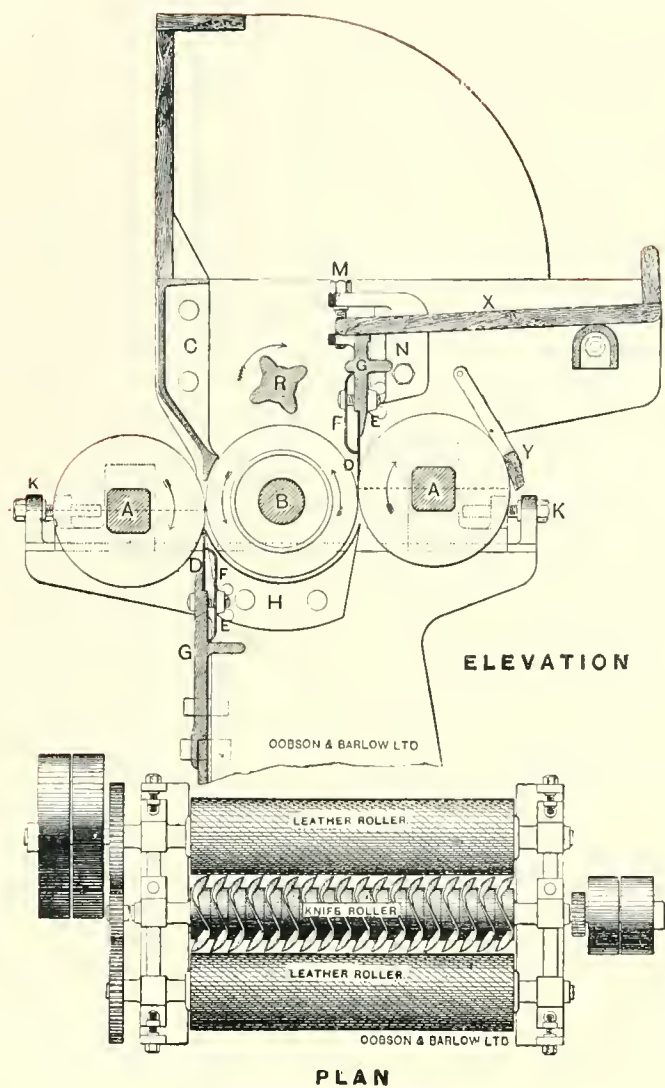
IMPROVED PATENT DOUBLE COTTON GIN WITH KNIFE ROLLER.

(DOBSON & ROSCOE'S PATENT.)



This Gin has a motion for detaching the Cotton from the seed which differs from and is a great improvement upon that in any other make of Gin.

It consists of a knife roller which is composed of a number of cast iron discs fitted upon a wrought iron shaft. This shaft revolves continuously in one direction and the knives move the seed cotton slowly to and fro upon



- A.A. Leather Rollers.
- B. Knife Roller.
- C. Dish Rail.
- D.D. Doctor Knives.
- E.E. Pressing Screws.
- F.F. Springs for Doctor Knife.
- G.G. Knife Rails.
- H. Grid.
- K.K. Adjusting Screws for Rollers.
- M. Adjusting Screws for Knife Rail.
- N. Knife Rail Bracket.
- R. Auxiliary Roller.
- X. Feed Table.
- Y. Roller Clearer.

Leather Roller Pulleys, 15" × 3"

Knife " " 10" × 3"

leather rollers which draw or detach the cotton from the seeds in the most effective manner. It is self-feeding, the cotton merely being lifted on to the feed table and passed through the machine.

This Gin is highly suitable for all classes of cotton and can be easily regulated for separating every variety of cotton from the seed.

Its action is gradual and gentle; consequently the quality of the staple is not injured.

The Machine possesses exceptional advantages for those sorts of short stapled cotton which adhere tenaciously to the seed.

It is undoubtedly superior to all others for simplicity of construction, facility for setting the various parts, economy in driving power and increased production combined with quality.

Grids are supplied for the different kinds of seeds.

The speed of the Gin should be slower for long stapled and tender cotton, and for that with woolly seed, than for short stapled cotton.

DIRECTIONS FOR SETTING THE KNIFE ROLLER GIN.

1. See that the flooring is firm and that the Gins are packed up level where the floor is uneven. Set the Gins parallel with the driving shaft; if this be not attended to, the straps will not run straight on the pulleys.
2. See that the speeds are right. The speed of the Improved Double Action Knife Roller should be 250 to 300 revolutions per minute. The speed of the leather rollers should be from 120 to 150 revolutions per minute.
3. For the sake of convenience when learning to set Gins, after the Gin has been secured in its place, the top part had better be taken off so that the parts can be plainly seen.

4. Set the bevelled edge of the bottom doctor knife against the leather roller A so that the edge of the knife may be same height as centre of leather roller; it may work well a little below but should never be above. The same principle applies to the setting of the top doctor knife D. The screws to adjust the bottom doctor knife are outside the framing on each side whilst those for adjusting the top doctor knife are shown at M. The doctor knife must be pressed against the leather roller by the steel springs F with as much pressure as the screws E can be tightened by hand. (It may be necessary to increase this pressure in ginning cotton the fibres of which cling with great tenacity to the seed, but as a rule the least practicable pressure should be used.)
5. The knife roller should be set parallel to the leather roller and as far from it as about one-third the diameter of the largest seed.
6. The dish rail C or cast iron piece forming the front of the Gin should just clear the knife roller; if there is too much room allowed the seeds will get between the knife roller and dish rail and will be broken. The point of dish rail C should clear leather roller $\frac{3}{16}$ in. to $\frac{1}{4}$ in. so that any cotton which may get between the two may not be jammed, but pass through and prevent the roller from being burned.
7. Place the grid at least half an inch clear of the knife roller and see that it joins up to the bottom doctor knife on one side and just clears the leather roller on the other.
8. See that the rollers run in the proper direction as shown by the arrows in sketch.

R E M A R K S.

Two to two-and-a-half indicated horse-power will work one Gin, but as the pressure of the doctor knife absorbs nearly 75% of the total power and as the pressure of the knife varies according to the class of cotton being ginned the horse power required will also vary.

If the cotton seems to hang on the leather rollers the knife roller is not acting properly and the leather rollers must be brought a little closer.

If the cotton comes out in small detached portions and stringy then the knife roller is too close and the leather rollers must be moved a little back.

NOTE.—A very slight movement of the setting screws will alter the working of the Gin.

If the seed is not thoroughly stripped of its cotton the holes in the grid are too large ; if the seed breaks in passing through, or does not pass freely, the holes are too small.

Grids with longitudinal bars are used for Cluster-Seed Cotton.

Care should be taken that the holes in the grid are large enough to allow the cleaned seed to pass through but no cotton.

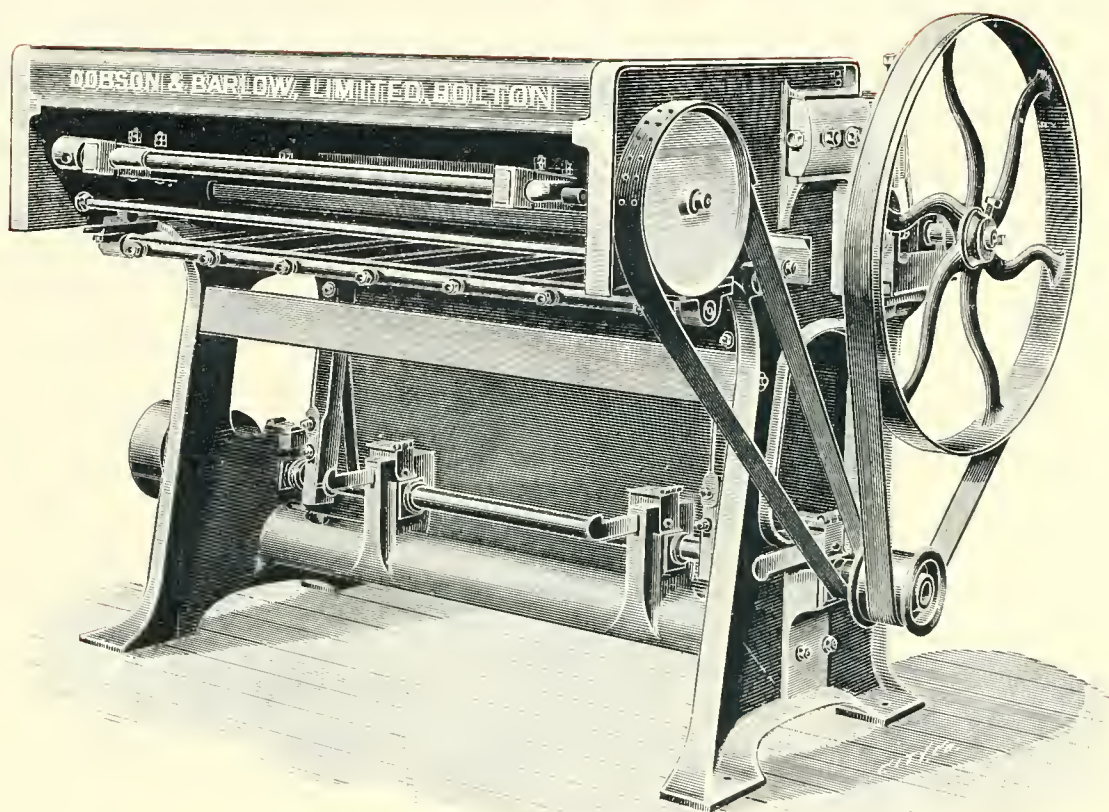
If the Gin is set right there should be no difficulty in producing 100 to 120lbs. ginned cotton per hour.

Space occupied by Gin 40in. wide,—5ft. 8in. \times 2ft. 8in.

Weight of Gin :—Gross 12 cwts. Net 8 cwts. 3 qrs.

Cubic measurement :—1 case, 6ft. 3in. \times 3ft. 9in. \times 3ft. = 70ft. 4in.

SELF-FEEDING SINGLE & DOUBLE ACTION POWER DRIVEN MACARTHY COTTON GINS.



SINGLE ACTION MACARTHY COTTON GIN.

These machines are to be found in most countries where Cotton Ginning by power is practised. They have stood the test of long experience and for some classes of cotton it may be confidently stated they are more suitable than other classes of Gins.

They consist, as may be well seen from the illustrations, of a roller covered with leather, either in solid washers or in strips fastened on to wood, against which is pressed a doctor knife.

The cotton is thrown into a hopper and falling is seized by the friction of the leather and drawn between the doctor knife and the leather surface.

Whilst this action is taking place there is a beater knife which is reciprocated at a considerable speed and which strikes the seed attached to the cotton drawn away by the leather roller. The detached seed then fall through a grid provided for the purpose.

The cotton is constantly fed to the roller by the action of an automatic feeder also with a reciprocal motion.

The difference between the Single and Double Action Gins can be clearly seen on reference to the illustrations. It will be seen that in the Double Action Gin there are two beater knives which also are reciprocating at equal speeds, but so arranged that one is going up when the other is coming down. The production of the Gin is considerably increased thereby and without increasing the speed of the reciprocating cranks. Each revolution gives two strokes and there is a tendency for one knife to balance the other so that there is less strain and vibration on the Gin and consequently less liability to break down.

PRODUCTION.—The production of the Single Action Gin should be about 30lbs. of cleaned cotton per hour, and of the Double Action Gin 40 lbs. to 45 lbs.

POWER.—For the Single Action Gin 1 horse-power will be sufficient and for the Double Action Gin $1\frac{1}{2}$ when running at 550 revolutions per minute.

Space occupied by Single or Double Action Gin :—5ft. 0in. × 3ft. 5in.

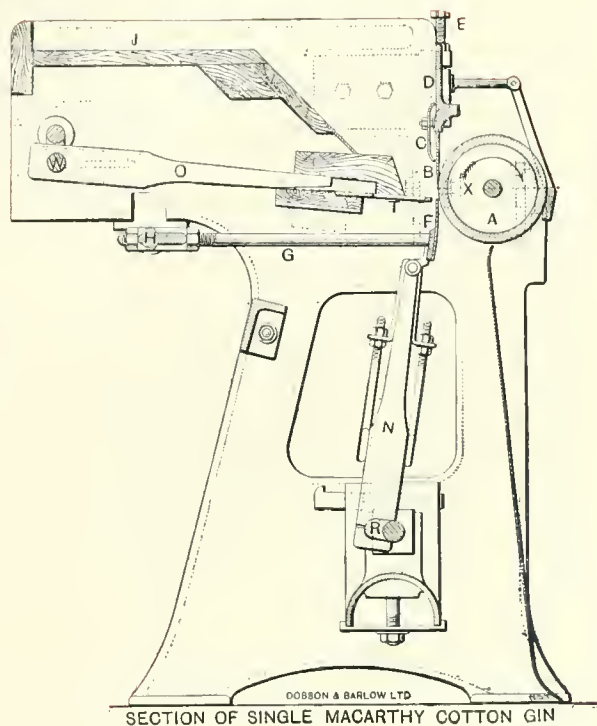
Single Action Gin:—Weight, Gross 8 cwt. Net 5 cwt. Cubic measurement, 64ft.

Double „ „ „ 9 „ „ 6 „ „ „ 68ft.

DIRECTIONS FOR SETTING GINS.

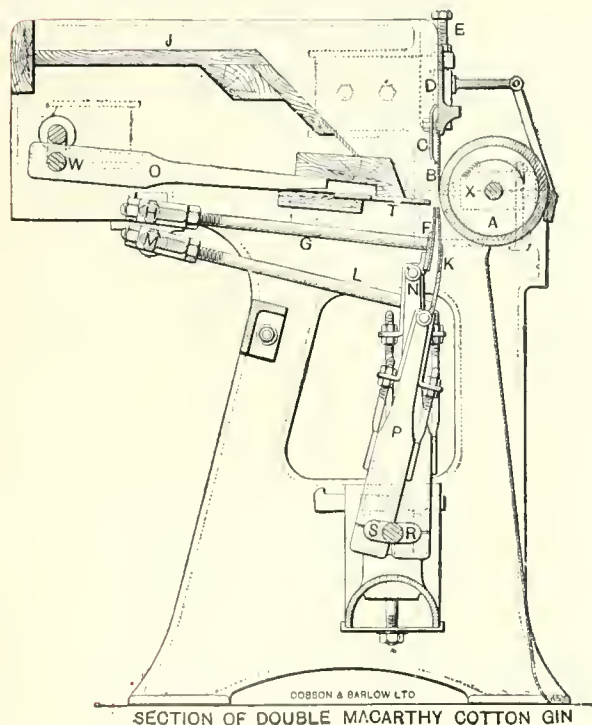
1—See that the flooring is firm and that the Gins are packed up level where the floor is uneven. Set the Gins parallel with the driving shaft; if this be not attended to the straps will not run straight on the pulleys.

2.—See that the speeds are right. The speed of the leather roller should be 150 revolutions per minute. The speed of the crank shaft for Single Action Gin should be 600-900 revolutions per minute, and that for the Double Action Gin 550.



SINGLE ACTION MACARTHY GIN.

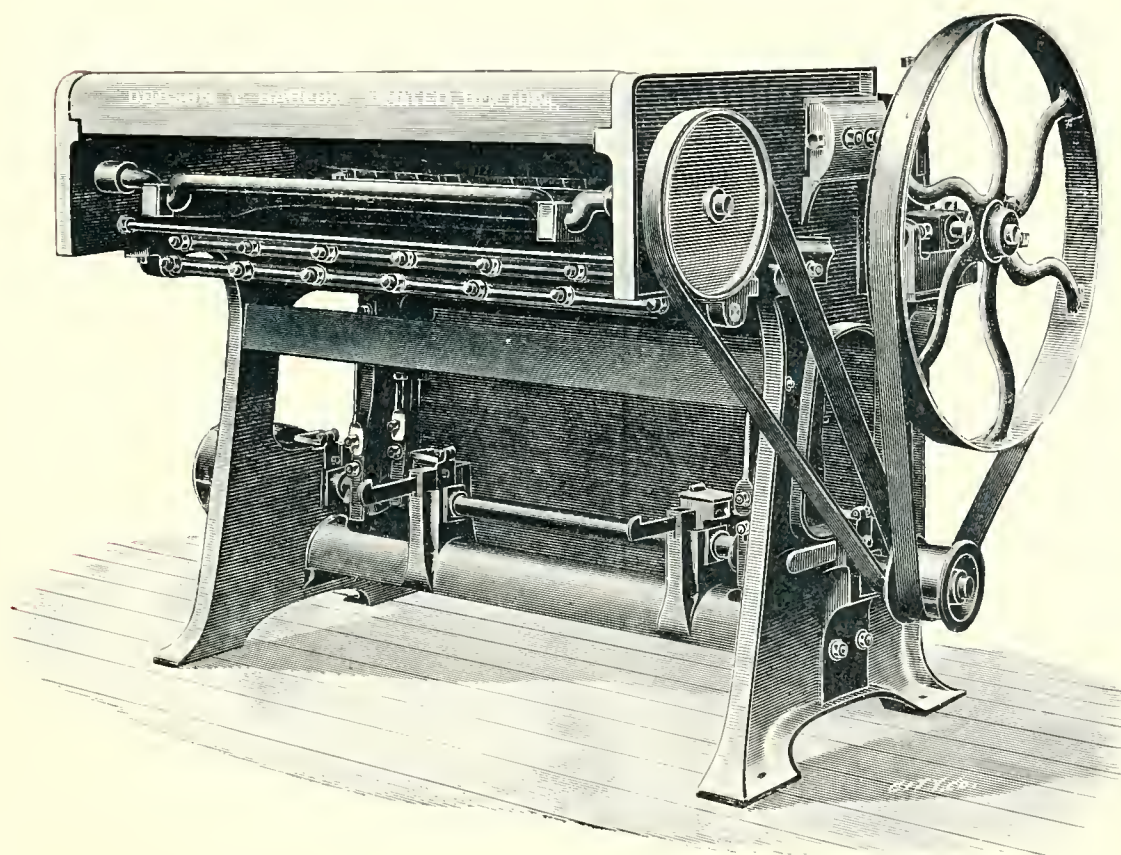
- A. Leather Roller.
- B. Doctor Knife.
- C. Springs.
- D. Doctor Knife Rail.
- E. Adjusting Screw for Knife Rail.
- F. Beater Knife.
- G. " " Bar.
- H. " " " Centre.
- J. Feed Table.
- N. Connecting Rod for Beater Knife.
- O. Feeder Bar.
- R. Crank for moving Beater Knife.
- T. Grid.
- W. Crank for Feeder Bar.
- X. Adjusting Screw for Leather Roller.



DOUBLE ACTION MACARTHY GIN.

- A. Leather Roller.
- B. Doctor Knife.
- C. Springs.
- D. Doctor Knife Rail.
- E. Adjusting Screw for Knife Rail.
- F. Upper Beater Knife.
- G. " " " Bar.
- H. " " " " Centre.
- J. Feed Table.
- K. Lower Beater Knife.
- L. " " " Bar.
- M. " " " " Centre.
- N. Connecting Rod for Upper Beater Knife.
- P. " " " Lower " "
- O. Feeder Bar.
- R. Crank for moving Upper Beater Knife.
- S. " " " Lower " "
- T. Grid.
- W. Crank for Feeder Bar.
- X. Adjusting Screw for Leather Roller.

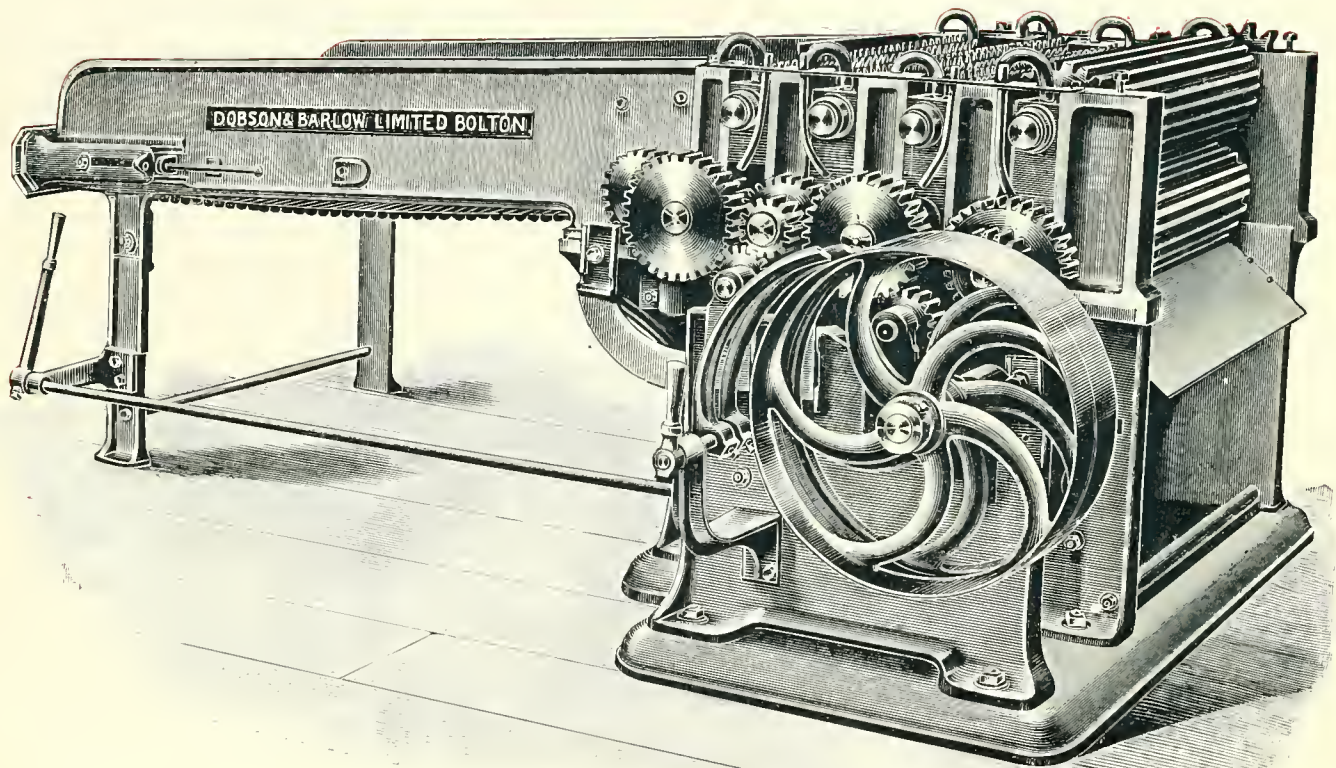
- 3.—Set the bevelled edge of the doctor knife against the leather roller, so that the edge of the knife may be in a line with the centre of leather roller.
- 4.—Set the beater knife F in Single Action Gin, and the knife K in Double Action Gin, by means of the nuts on the beater knife bars to about $\frac{1}{2}$ of an inch from the doctor knife when passing it.



DOUBLE ACTION MACARTHY COTTON GIN.

- 5.—When ginning short stapled cotton the beater knife F in Single Action Gin, and the knife K in Double Action Gin, should overlap the doctor knife $\frac{3}{8}$ of an inch, but for long stapled cotton $\frac{1}{2}$ or $\frac{5}{8}$ of an inch is the usual overlap.
- 6.—The feeder bar can be adjusted as to its travel according to the size of the seeds.
- 7.—See that the grid is adjusted so that the seeds fall freely through it.

IMPROVED POWERFUL BALE BREAKER OR COTTON PULLER.

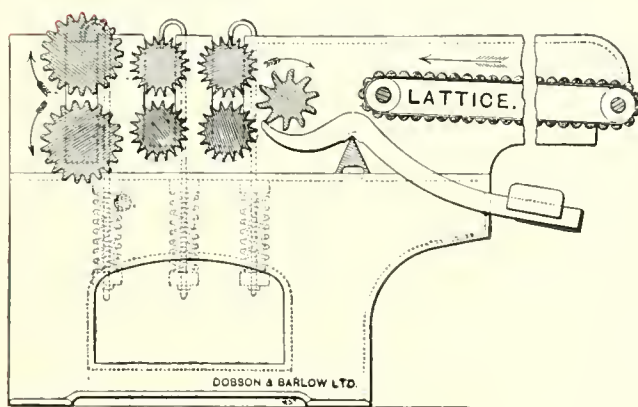


The object of this Machine is to loosen the hard, lumpy, compressed portions of cotton, and to free it as much as possible from all the heavy impurities before passing it through the Opening Machine. It also relieves the Opener from unnecessary strain, prevents breakdowns, and its use is a great saving in wages, as compared with hand labour, with safer and better results.

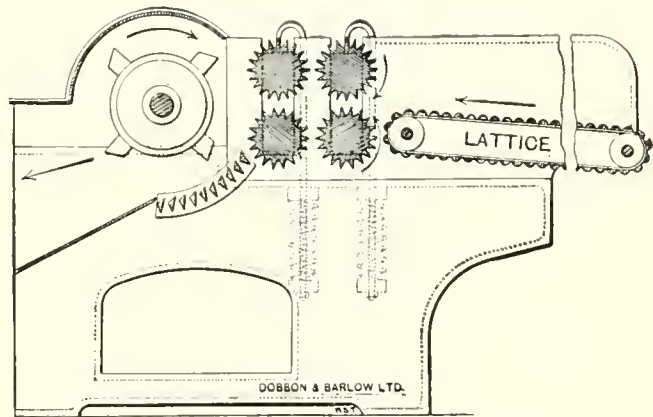
The Machine is made 2 ft. 8 in. wide, with four pairs of differentially speeded rollers weighted by strong spiral springs; the first pair of rollers and the top rollers of the second and third pairs are made in sections with strong teeth, so that if any of the teeth of a particular section get broken that section can be removed and replaced without renewing the whole of the roller—the bottom rollers of the second and third pairs and the fourth pair of rollers are all coarse fluted. The toothed rollers are arranged to give any extent of draft that may be required for the different classes of cotton to be worked, so as to obtain the best features of hand pulling. Lattice feed 5 ft. 6 in. long. Fair and good American, Egyptian and Sea Islands Cotton are worked on this Machine.

All gearings and rollers are carefully guarded with iron covers.

Perfect lubrication of all working parts.



SECTION OF PEDAL BALE BREAKER.



SECTION OF PORCUPINE BALE BREAKER.

We also make a Breaker with one fluted feed roller, one fluted pedal roller under which is placed a set of pedals, and three pairs of differentially speeded rollers weighted by strong spiral springs—the top rollers of the first and second pairs made in sections with strong teeth and the bottom rollers and the third pair of rollers coarse fluted. Lattice feed 5 ft 6 in. long. This Machine is for working similar classes of cotton to the above but by substituting pedals for the first pair of rollers the cotton is much better pulled than by the above.

We also make this Machine with two pairs of rollers weighted by strong spiral springs—the tops made in sections with strong teeth and the bottoms coarse fluted—and a small porcupine cylinder 14 in. dia. made of hardened steel teeth riveted on to circular rings, for Indian and low middling American Cotton.

Elevating Lattice, 2 ft. wide, for raising the cotton from the Breaker to the mixing lattices.

Mixing Lattices; 2 ft. wide, with reversing and slackening motions, arranged so that the cotton may be dropped on to the mixings at any desired place.

These Machines will each open from 80,000 to 90,000 lbs. of cotton per week.

Space occupied, with lattice feed 5 ft. 6 in. long :—

Breaker with 4 pairs rollers—8ft. 4in. × 5ft. 5in.

„ „ 3 „ and pedals—8ft. 10in. × 5ft. 5in.

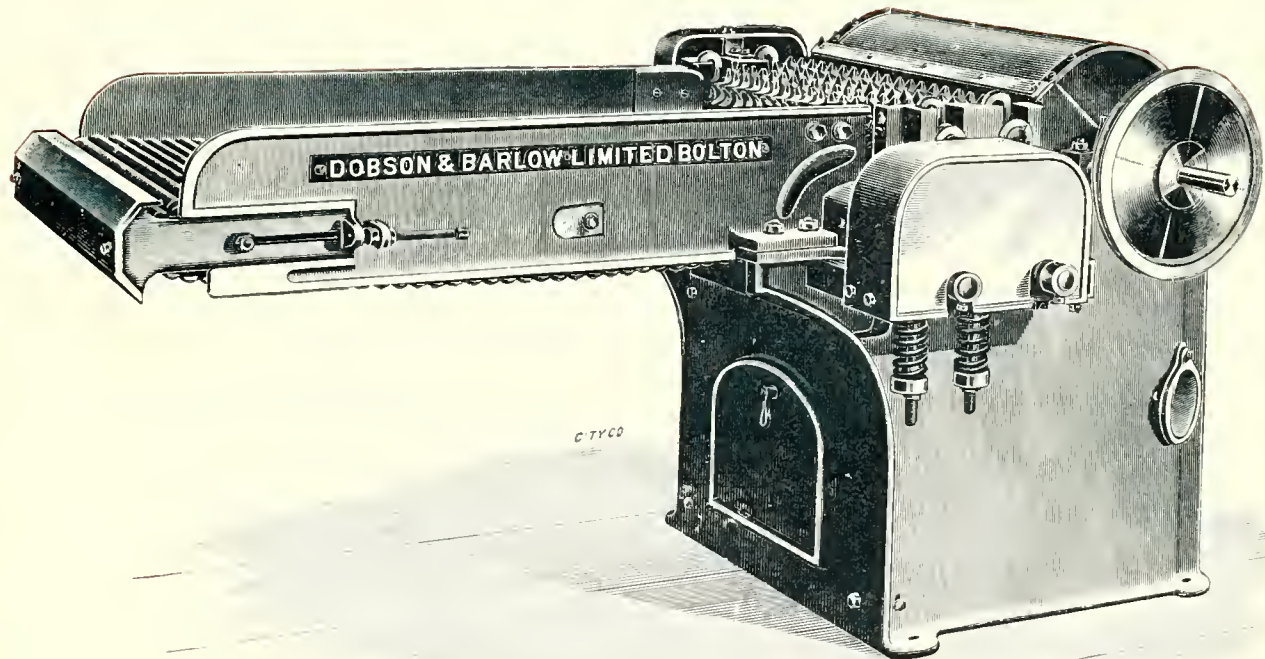
„ „ 2 „ and cylinder—8ft. 2in. × 5ft. 0in.

Weights and cubic measurements :—

Breaker with 4 pairs rollers—Gross 35 cwts. Net 30 cwts. 90 cubic feet.

„ „ 2 „ and cylinder—Gross 27 cwts. Net 22 cwts.)
80 cubic feet.)

SMALL PORCUPINE OPENER.



This Opener is generally employed to feed Single and Double Vertical Beater Openers, and Vertical Beater Openers and Scutchers combined. It can be used also as a separate Machine. Its object is to open and free the cotton from dirt and other extraneous matter previous to entering the Vertical Beater.

This Opener can be joined to the Vertical Openers or placed at a reasonable distance from them and connected by a horizontal or upright travelling lattice, or by pipes. It can likewise be placed in any desired position in a room above or below and connected in the same manner.

It is made 27 ins. wide and has a cylinder 14 ins. diameter made of hardened steel teeth riveted on to circular rings and two pairs of fluted feed rollers which are weighted by dead weights, levers with movable weights or strong spiral springs.

The Lattice Feeder, which is 2 feet wide, can be made any length.

This Machine will produce up to 40,000 lbs. per week.

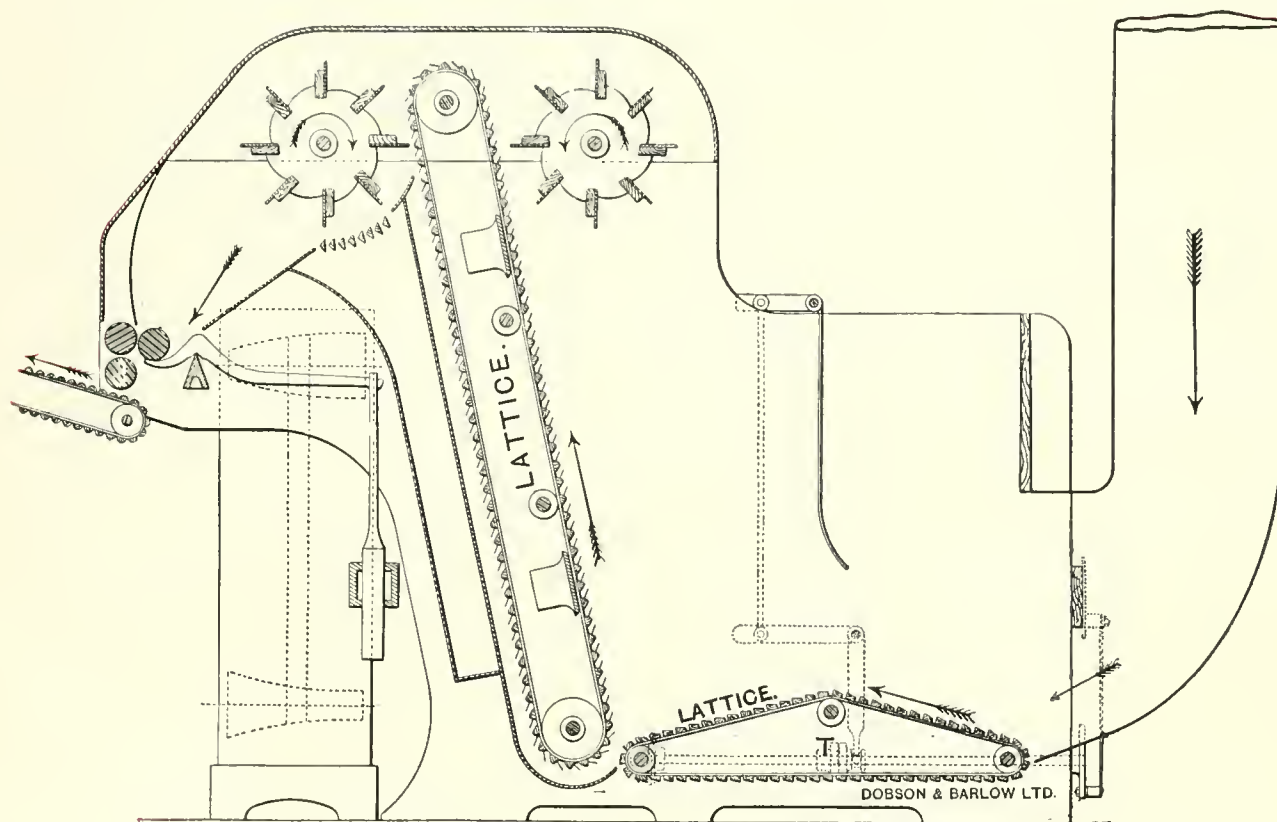
Space occupied, with Lattice Feed 4 feet long :—6ft. 1in. × 4ft. 0in.

Weights :—Gross 18½ cwt. Net 14 cwt. Cubic measurement 78ft.

IMPROVED "SIMPLEX" AUTOMATIC HOPPER FEEDER

WITH FEED & DELIVERY REGULATING MOTIONS.

Amongst the most recent application of labour saving contrivances for cotton spinning mills is what is known as the Automatic Hopper Feeder which is applied to the Opener.



SECTION OF "SIMPLEX" AUTOMATIC HOPPER FEEDER.

For some time efforts have been made to save the wages of handling the cotton in the preparation. The recent development of improvements in this machine seems to have arrived at the acme of perfection.

The Automatic Hopper Feeder is an adaptation of that in use for woollen Cards and has in several forms been long used in American mills. The Hopper being filled with cotton, a certain portion is taken by the travel of a spiked lattice with a roller set to clear the supercharge of cotton and a stripping roller on the other side which detaches the cotton from the lattice and feeds it to the Opener lattice.

It was first thought that no matter what amount of cotton was in the Hopper the feeding would be approximately equal. This has been found to be incorrect, and with the best Hopper made the lap furnished will be heavier if there is much cotton in the Hopper than if there is very little. It is therefore desirable to maintain the weight of cotton under operation in the Hopper at something like a uniform amount and several attempts have been made more or less successfully towards this end. We are happy to state that we have purchased the patent rights of Messrs. Musgrave & Cooper, who have invented a motion for the purpose of regulating the feed to the Hopper itself which seems to be ideally perfect.

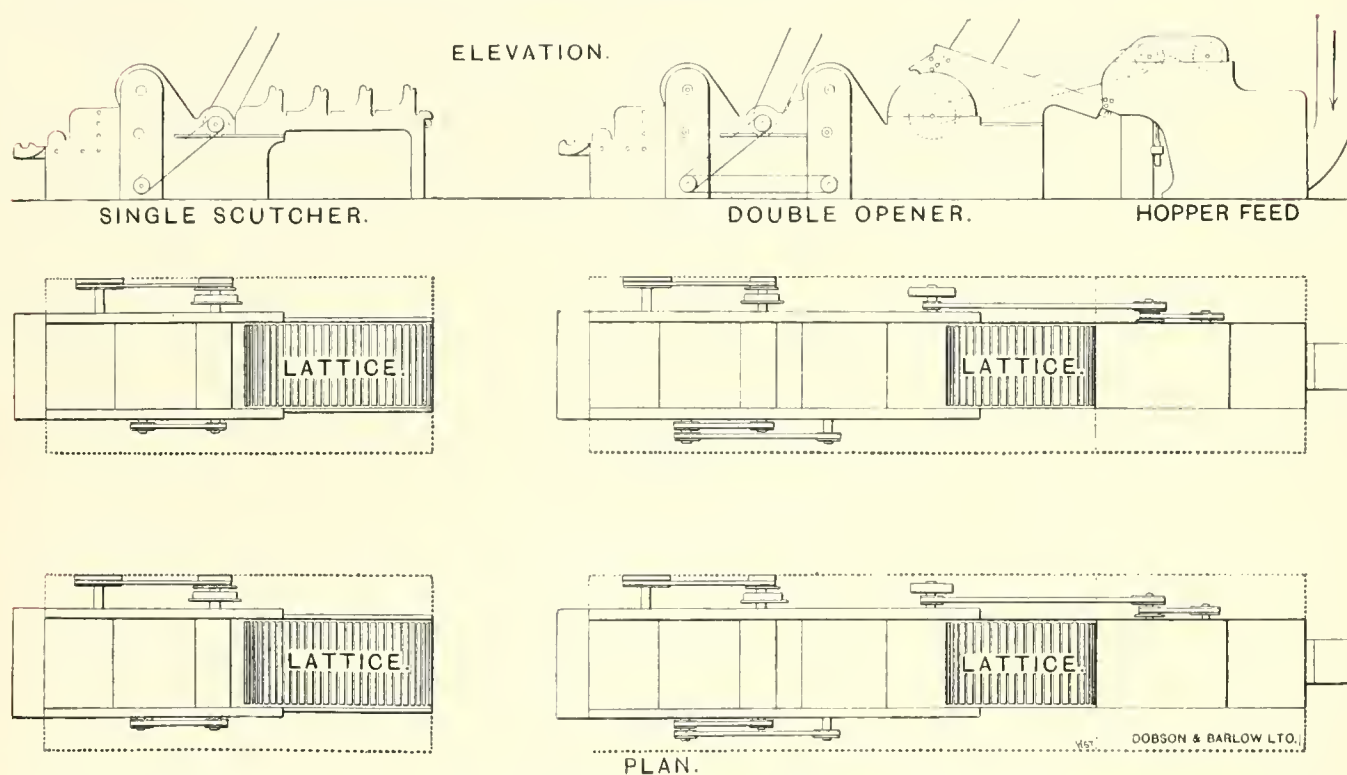
To show the operation of this feed regulator we will suppose that a mill requiring 3 or 4 Openers is furnished in the mixing room with a Bale Breaker and travelling lattices to the various mixings. Down the centre of the room is another travelling lattice for the purpose of conveying the cotton to be fed to the Openers from the different mixings, then when arrived at the feeding end of the room all the operative has to do is to maintain the cotton in the trunks or pipes leading down to the Hoppers as nearly as possible level with the floor—although provided there is any cotton at all in the trunk the regulator still acts perfectly. At the lower part of the trunk where it is turned into the back of the Hopper there is a shutter door operated by mechanism driven by the Hopper. Across the framing of the Hopper is a rod having on it feeler bars. These feeler bars are pressed upon by the cotton being dealt with by the lattice and in case the amount of cotton is in the slightest degree too great the feeler bars are deflected, a catch box put in gear, and the shutter door is closed, thus preventing any further feeding from the trunk until the superfluous cotton in the Hopper has been dealt with. Should the cotton be less in amount than it ought to be the catch box again operates and opens the door, permitting the horizontal lattice of the Hopper to draw in the cotton from the bottom of the trunk.

The evening roller of the Hopper is made of special design which has the effect of allowing waste of all kinds to be mixed with the cotton. In

many Hoppers this waste creates a difficulty owing to the practical impossibility of stripping. This objection has been overcome.

There is a pedal feed regulator at the exit of the Hopper and a pair of fluted rollers with a constant speed for delivery on to the opening machine. Thus it will be seen that any variation in the feeding from whatever cause is regulated before the Opening Machine is reached.

The regulator consists of the well-known upright cone box with convex and concave cones, but has some specialities that are worthy of notice.



In the first place the cones are much larger in diameter than is usually the case.

There is a pedal motion in which the pedal pendants are provided with anti-friction bowls, reducing the friction to a nominal amount. In all pedal motions the action can only take place at one end of the pendant of the rail and therefore if the whole of the pendants are actuated together the outside pendants have a very considerable inclination, which by the natural strain on the various parts, makes the motion heavy to work, and also introduces an element of error on account of the difference of the angle. This we have obviated by making the centre pendant vertical and acting outwards in each direction.

There has also always been a difficulty in regulating these motions to extreme accuracy on account of the varying angles of the levers employed. In our patent motion this is entirely obviated by the use of pulleys and steel wire or steel bands, absolutely preventing backlash, and giving a constant value of movement in whatever position the pedals may be. The motion is simple and not liable to get out of order.

By the employment of the Hopper and the trunk regulator no labour is required at the feeding end of the Openers in the Scutching Room and thus one hand per machine is saved.

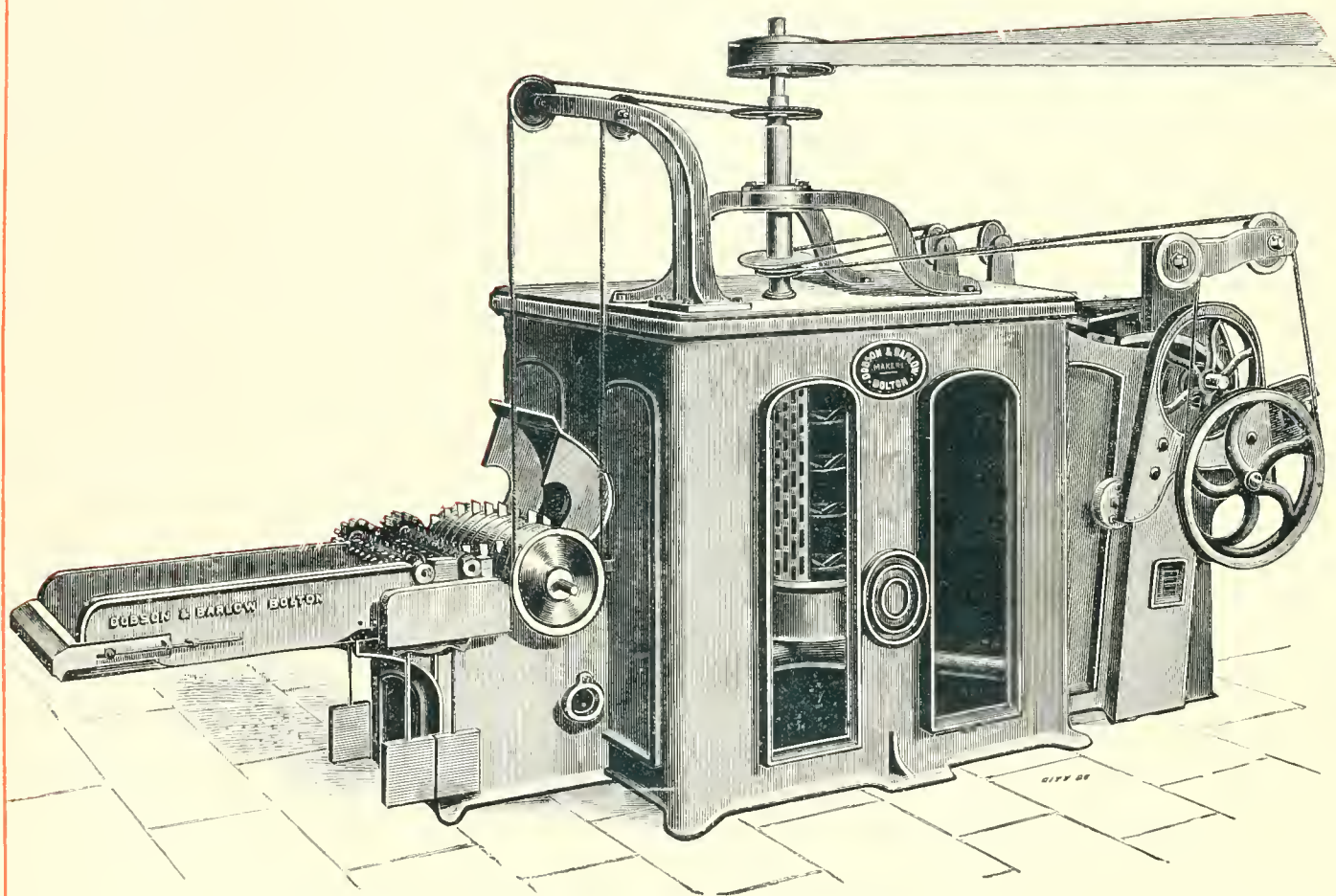
But above and beyond the saving of labour is the extraordinary regularity achieved by this feed. The cotton fed to the Opener is in every case as regular and as level as if it were to be made into a lap, and this is clearly proved by the extraordinary improvement in the weighing of the laps, per lap and per yard, where these motions have been applied.

Although the action of the lattices and the evening rollers has a tendency to open the cotton to a certain degree it must be clearly understood that this machine is not intended to supplant the Opener, but is simply designed for the purpose of feeding the cotton to the opening machine with perfect regularity.

Space occupied :—7ft. 8in. \times 6ft. 7in. If with feed trunk attached add 1ft. 8in. to length.

Weights :—Gross 45 cwts. Net 35 cwts. Cubic measurement 181 feet.

IMPROVED VERTICAL BEATER OPENER.



This Machine is highly suitable for all classes of short stapled cotton. It has been carefully designed and specially built from extra strong patterns to ensure absolute rigidity; all the jointings are planed or milled and

every attention has been given to the different details to enable the Machine to be run at the highest speeds without any vibration. Perfect lubrication of all working parts. Improved grids; most effective opening and cleaning power; all fibres thoroughly well separated without damage. Feed and delivery lattices are driven by bands. Vertical shaft carries seven discs with hardened steel plates of different diameters, turned and balanced, with steel teeth riveted to them. Feed funnel at back or side. Improved self-lubricating beater footstep; this footstep is arranged to hold about a quart of oil which acts as a preventive to the shaft heating, thereby reducing the amount of attention and the danger of fires, &c. Strong gearings well guarded. All pulleys are balanced.

Openers with two beaters are also made on this principle, and are arranged that the beaters can be worked together or separately.

Single or Double Vertical Beater Opener as above, combined with Single Scutcher and Lap Machine as described and illustrated on page 26.

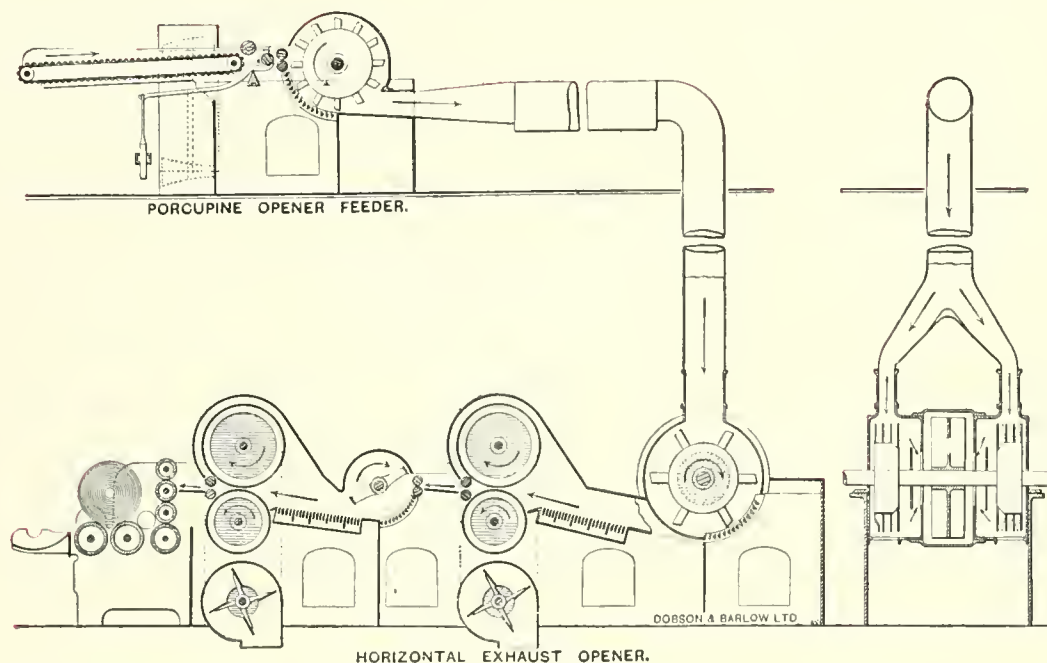
These Machines are also made to be fed by a Small Porcupine Opener with lattice feed as shown in the illustration and as described on page 13; and are also made to be fed through trunks as an Exhaust Opener. The "Simplex" Hopper Feeder can be applied to the Small Porcupine Opener if desired.

A Single or Double Opener will produce 30,000 to 40,000 lbs. per week.

	SPACE OCCUPIED.	WEIGHTS.		CUBIC MEASUREMENT
		GROSS.	NET.	
Single Opener	10' 5" × 5' 2"	67 cwts.	50 cwts.	309 feet.
Double „	16' 6" × 5' 2"	106 „	78 „	505 „
Single Scutcher and Lap Machine, 38" laps	8' 8" × 6' 7"	97 „	67 „	410 „
Small Porcupine Opener with Lattice feed 4 ft. long	6' 1" × 4' 0"	18½ „	14 „	78 „
Small Porcupine Opener and Hopper Feeder combined	15' 0" × 6' 4"	65 „	50 „	275 „

IMPROVED HORIZONTAL EXHAUST OPENER

Combined with Single Scutcher & Lap Machine and Porcupine Opener Feeder.



This Machine is constructed upon most recent principles for opening cotton and making the same into laps. We have most carefully considered all details necessary to give the very best results.

The Opener consists of an Exhaust Fan and two Porcupine Cylinders which are so arranged as to give a free and easy passage to the cages, the cotton being spread on the latter in a very even manner. The Machine is provided with two sets of cages with a dust fan to each set, cylinder bars, two sets of dust bars and dust chambers, two or three bladed beater 16in. diameter, and Lap Machine.

The Porcupine Opener Feeder is made 36in. wide and consists of a cylinder made of hardened steel teeth riveted on to circular rings, and has a collecting roller, one fluted pedal roller, one pair of fluted feed rollers, dust bars and dust chamber. There is applied to this Feeder an Improved Vertical Cone Feed Regulator with large size horizontal cones driven by gearing and an Improved Pedal Motion with four anti-friction bowls between each pedal pendant to reduce the friction against the pedal pendants to a minimum.

The lattice feed can be made any required length.

The Porcupine Feeder can be placed at any distance from the Exhaust Opener as desired, or in the Mixing Room above or below, and is connected with the latter by means of wrought iron tubing and dust trunks. The connection between the Feeder and Opener is arranged so that the feed rollers in the former are automatically taken out of gear when a lap is completed.

Improved Dust Cages and Dampers to regulate the amount of air to be passed through the cages.

Beater with hardened steel blades—the blades are planed on both edges so that when one edge is worn the beater can be reversed.

Safety Motion to beater cover—by the means of this the beater cover can only be raised when the machine is stopped.

Fans for up or down draught.

All dust chambers and partitions are made of iron.

Lap Rollers bored for patent Lap Rods if required.

The Lap Machine of the Opener is made from entirely new designs, to secure the working of the various parts with a minimum of driving power. Four consolidator calender rollers driven direct from beater are applied.

The driving arrangement of the two machines is such as to prevent any irregularity in speed between the feed rollers of the Feeder and the calender rollers of the Opener.

Improved Clearer to prevent the cotton lapping upon the calender rollers. This also overcomes the frequent breakages of the calender roller wheels.

All gearings are very strong and are carefully guarded.

Perfect and easy lubrication of the different working parts.

Any changes required can be easily and readily made.

This Machine will produce up to 25,000lbs. per week according to the class of cotton.

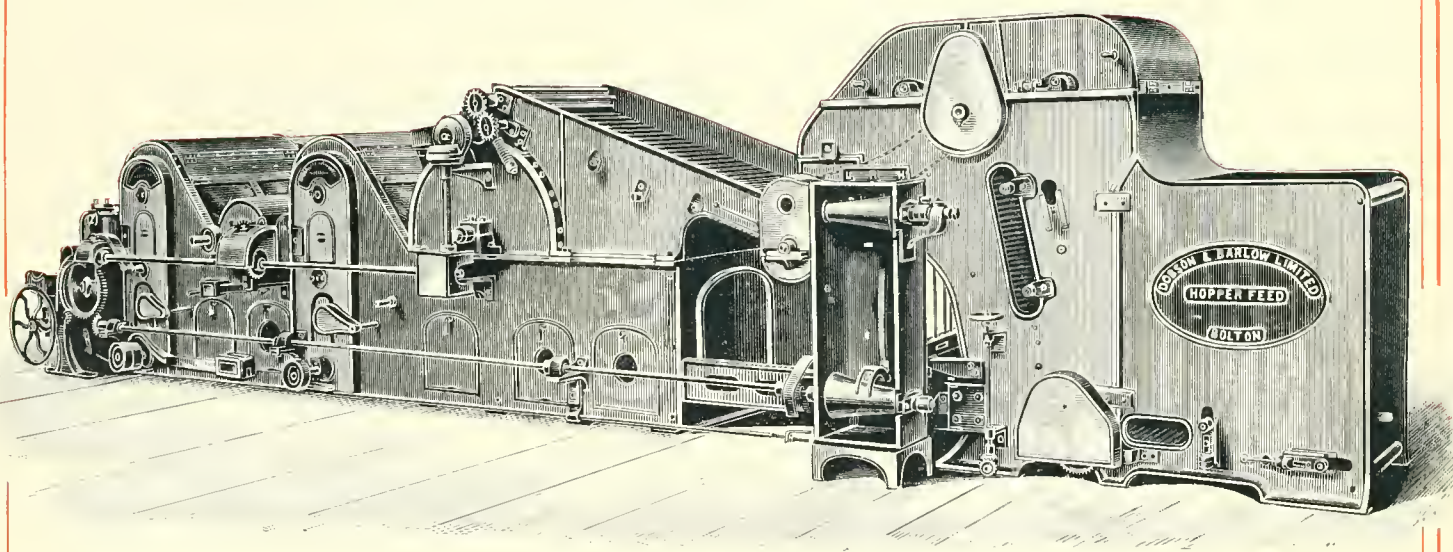
Our "Simplex" Automatic Hopper Feeder can be applied to the Porcupine Opener Feeder if desired.

	SPACE OCCUPIED.	WEIGHTS.		CUBIC MEASUREMENT
		GROSS.	NET.	
Porcupine Opener Feeder	11' 6" × 6' 4")	170 cwts.	133 cwts.	630 feet.
Opener with Lap Machine, 38" laps	16' 11" × 6' 7")			
If with Hopper Feeder....add	3' 6" to length of	31 "	21 "	140 "
Opener Feeder	Opener Feeder			

IMPROVED LARGE SIZE DOUBLE COTTON OPENER

WITH ONE CYLINDER 37 in. DIAMETER, ONE BEATER 16 in.
DIAMETER, AND **LAP MACHINE** COMBINED.

THE IMPROVED "SIMPLEX" AUTOMATIC HOPPER FEEDER
CAN BE APPLIED TO THIS MACHINE.



This Machine has recently been entirely remodelled, and is constructed upon principles resulting from many years' experience. All details have been carefully considered so as to embrace every point that will tend to give the very best results.

Openers made from these patterns are working in the most satisfactory manner and are unequalled for Egyptian, American, and similar classes of cotton.

It has a **greater** area of **cleaning power** and also a more free and direct course for the passage of the cotton than any other Machine made. The cotton is carried upward by the cylinder, and is so effectively manipulated in its passage through the Machine, that it is entirely cleaned and freed from seed, leaf, dirt, sand and all other impurities.

The laps are taken direct to the Finishing Scutcher, which of course means dispensing with the cost of a Breaking or Intermediate Scutcher and the wages of the minder.

The Cylinder Cover Plates are made of strong iron, the undersides of which have strong conical tooth projections which assist the cylinder very materially in opening and freeing the cotton from all extraneous matter, as the cotton in being carried round by the cylinder comes in contact with these tooth plates and the heavier impurities are completely loosened and discharged through an improved series of adjustable graduated grate bars, arranged so as to prevent these impurities from being drawn in with the cleaned cotton by the fan draught.

Improved Dust Cages and Dampers to regulate the amount of air to be passed through the cages.

Cylinder Tooth Plates made with chilled cast iron teeth.

Beater with hardened steel blades—the blades are planed on both edges so that when one edge is worn the beater can be reversed.

Safety Motion to beater covers—by the means of this the beater covers can only be raised when the machine is stopped.

Improved Beater Bars which can be regulated and set to any required distance.

Improved Longitudinal or transverse dust box bars.

Fans for up or down draught. All dust chambers and partitions are made of iron.

Lap Rollers bored for patent lap rods if required.

Improved Vertical Cone Feed Regulator with large size horizontal cones driven by gearing.

Improved Pedal Motion to cylinder feed rollers with four improved anti-friction bowls between each pedal pendant to reduce the friction of the bowls to a minimum, thereby securing a free and easy motion to the pedal pendants.

(This Machine can be made without pedal motion, if desired). A Pedal Motion with self-weighted pedals can also be applied to beater feed roller, if desired.

The Machine is provided with one pair of feed rollers and one pedal roller to cylinder, and one pair of feed rollers to beater—the latter are adjustable. The draft in the rollers can be regulated to any degree so as to assist in opening and freeing the cotton before it gets to the beaters.

Lap End made from entirely new designs to ensure the smooth working of the various parts with a minimum of driving power. Two or four Consolidated Calender Rollers, driven direct from beater; preventing any irregularity in speed between the calender rollers and feed rollers as is the case when driven otherwise.

Improved Clearer to prevent the cotton lapping upon the calender rollers; this also overcomes the frequent breakages of the calender roller wheels.

All gearings are very strong and are carefully guarded.

Perfect and easy lubrication of the different working parts.

Any required changes can be easily and readily made.

This Machine will produce up to 25,000 lbs. per week according to the class of cotton.

WE CLAIM THE FOLLOWING ADVANTAGES IN THIS MACHINE:—

Increased opening and cleaning power.

Increased area of dust bars.

Free and direct course of the cotton during its operation and passage through the Machine.

No objectionable return angles in the passage of the cotton.

Improved Tooth Cover Plates to the cylinder.

Absolutely regular laps both in the total weight of the lap and the weight from yard to yard.

Least possible injury to the cotton fibre.

Delicate cotton can be made into regular laps without being passed through any other Machine.

Less waste in preparation of cleaning than in any other Machine in the trade.

Practical results unequalled.

We also make Single Openers exactly as described above, but without the beater, for Sea Islands cotton and other classes of good cotton that are easily damaged in working.

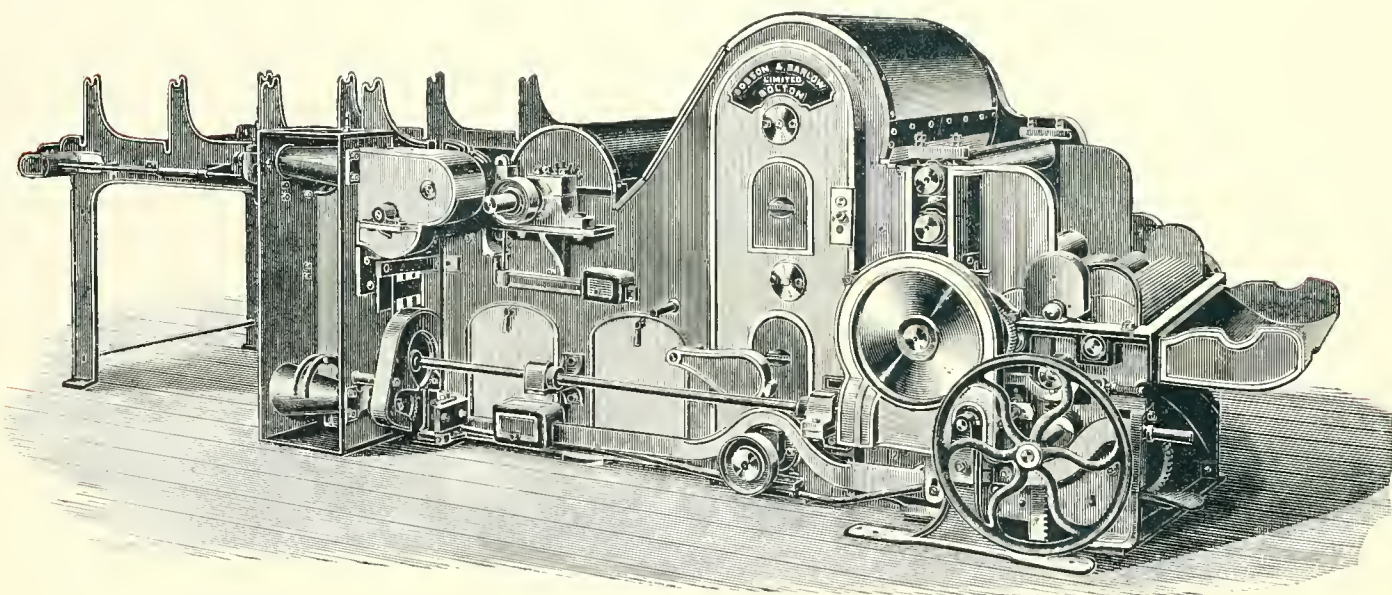
	SPACE OCCUPIED.	WEIGHTS.		CUBIC MEASUREMENT.
		GROSS.	NET.	
Double Cotton Opener 38" laps	20' 6" × 6' 7"	153 cwt.	121 cwt.	623 feet.
Single ,, ,, 38" ,,	15' 0" × 6' 7"	130 ,,	94 ,,	453 ,,
For Hopper Feeder .....add	7ft. to length	31 ,,	21 ,,	140 ,,

If feed trunk is attached to Hopper Feeder add 1ft. 8in. to length.

We also make Openers with one, two or three cylinders 18 in. dia., and one beater 18 in. dia., each running at a different speed. To these Machines we apply a Lap Machine and Cone Feed Regulator with Pedal Motion, and they are suitable for some classes of Egyptian Cotton. The "Simplex" Hopper Feeder can also be applied to these Openers.

IMPROVED SINGLE AND DOUBLE SCUTCHERS AND LAP MACHINE COMBINED.

MADE FROM THE MOST APPROVED DESIGNS, EMBODYING ALL THE LATEST AND LEADING POINTS TO ENSURE THE VERY BEST RESULTS—MOST EFFECTIVE CLEANING POWER WITHOUT DAMAGING THE STAPLE—REGULAR AND EVEN LAPS WITH PERFECT SELVAGES.



One or two Beaters 16 in. diameter, with 2 or 3 hardened steel blades; the blades are planed on both edges, so that when one edge is worn the Beater can be reversed. The Beaters can be arranged to strike from feed rollers or from pedal nose as desired.

Improved Vertical Cone Feed Regulator, with large size horizontal cones driven by gearing.

Improved Pedal Motion with four improved anti-friction bowls between each pedal pendant to reduce the friction of the bowls to a minimum, thereby securing a free and easy motion to the pedal pendants.

Most approved arrangement of feed rollers, according to the class of cotton to be worked.

Lap End with two or four consolidating calender rollers driven direct from Beater, preventing any irregularity in speed between the calender rollers and feed rollers, which is the case when driven otherwise.

Lattice-feed driven at both ends to avoid any irregularity of tension, or strain; can be arranged for spreading or for doubling four laps.

Fan for up or down draught. All dust chambers and partitions are made of iron.

Lap Rollers bored for patent lap rods if required.

Improved Beater Bars, which can be regulated and set to any required distance.

Improved Longitudinal or Transverse Dust Box Bars.

Improved Dust Cages and Dampers to regulate the amount of air to be passed through the cages.

Safety Motion to beater cover—by the means of this the beater cover can only be raised when the machine is stopped.

Improved Clearer to prevent the cotton lapping on the calender rollers; this also overcomes the frequent breakages of the calender roller wheels.

Either three or four laps can be worked without altering change wheels, the weight of lap produced being constant.

All gearings are very strong and are carefully guarded.

Perfect and easy lubrication of the different working parts.

Any required changes can be easily and readily made.

These Machines will produce 15,000 lbs. to 20,000 lbs. per week.

Space occupied by Single Scutcher, 38 in. laps—16 ft. 6 in. × 6 ft. 7 in.

„ „ Double Scutcher, 38 in. laps—22 ft. 0 in. × 6 ft. 7 in.

Weight of Single Scutcher—Gross, 94 cwts.; Net, 68 cwts.

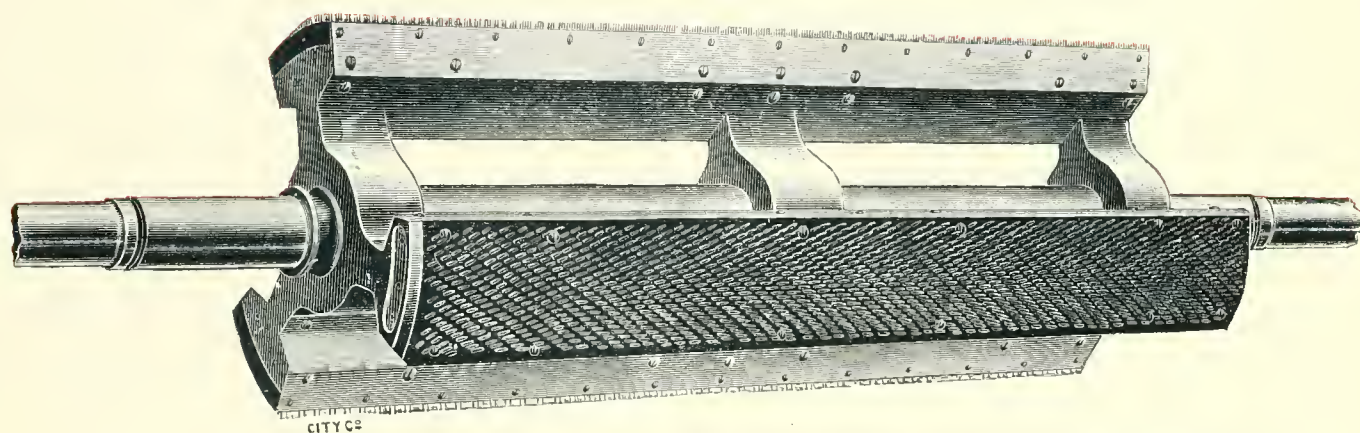
Cubic measurement, 368 feet.

Weight of Double Scutcher—Gross, 140 cwts.; Net, 98 cwts.

Cubic measurement, 523 feet.

IMPROVED TOOTHED BEATER

FOR
OPENERS AND SCUTCHERS.

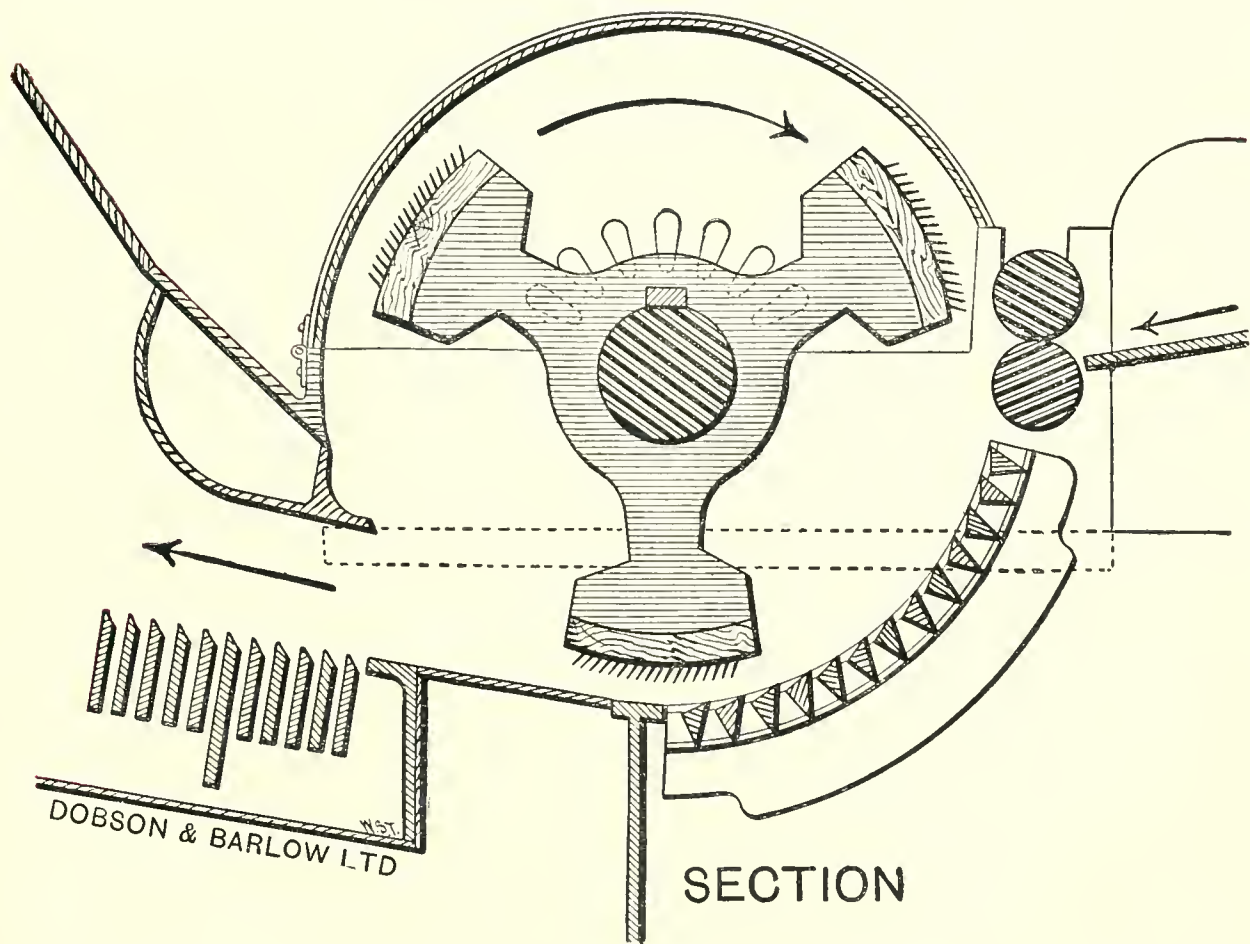


With the improvements in Carding Engines and the increased regularity required in the numbers spun in cotton mills producing all numbers of counts, and through the abolition of double carding, the necessity for increased regularity of the laps feeding the Carding Engines has become greater. On account of the hard pressing of the cotton in the hydraulic Baling Press it is very difficult to separate the fibres into their original woolly condition. This may be seen in any lap behind a Carding Engine however much the cotton may have been scutched.

It is further always admitted that it would be a good thing if the cotton could be so opened that the Carding Engine should not have presented to it cotton in lumps or strings. It has however hitherto been considered almost

impossible to perform this work with the requisite speed and production without injuring the staple of the fibre worked. In Kirschner's Improved Toothed Beater all these points have been carefully considered and the result would seem to prove that the fears as to injury to the fibre were ill founded.

The following wood-cut shows how the Beater is placed and its general features.



The Beater is arranged with 3 bars carrying lags, in which are placed tempered steel teeth the length and fineness varying according to the work to be accomplished.

It can be applied to all existing machines with scarcely any alteration, the principal alteration required being the arrangement of air holes to improve the ventilation.

The Beater itself forms a powerful fan which has the advantage of driving the dirt and shell through the bars, while the cotton, being in a more separated condition, is so much lighter that the cages are well and equally covered.

At the same time the fan of the machine requires running at less speed on account of the current of air caused by the beater itself.

The ADVANTAGES claimed are as follows:—

Better cleaning properties.

Lap more homogeneous and regular.

Lap always well made, cylindrical and with good edges.

Lap never sticking or felting behind the Cards.

Less grinding of Cards on account of cotton being more open, parallel, and clean, therefore less wear on the points of the wire.

Stronger and more elastic yarn.

The experiments made and the examinations of the experts who have been entrusted in France with this work show that for the same numbers of yarn there is a noteworthy increase in the elasticity of the yarn, averaging nearly 1%, whilst the strength shows an invariable increase as compared with the rigid beater.



WE ARE EXTENSIVE MAKERS OF
IMPROVED GRINDING ROLLERS

(One pair required for 30 Cards)

WITH TRAVERSING DISC

Covered with plain or grooved emery.

Covered with plain or grooved emery filleting.

SPARE DISCS FOR THE ABOVE ROLLERS.

ORDINARY OR "DEAD" GRINDING ROLLERS

(One required for 20 Cards)

Covered with plain or grooved emery.

Covered with plain or grooved emery filleting.

WIRE STRIPPING BRUSHES.

(One required for 30 Cards)

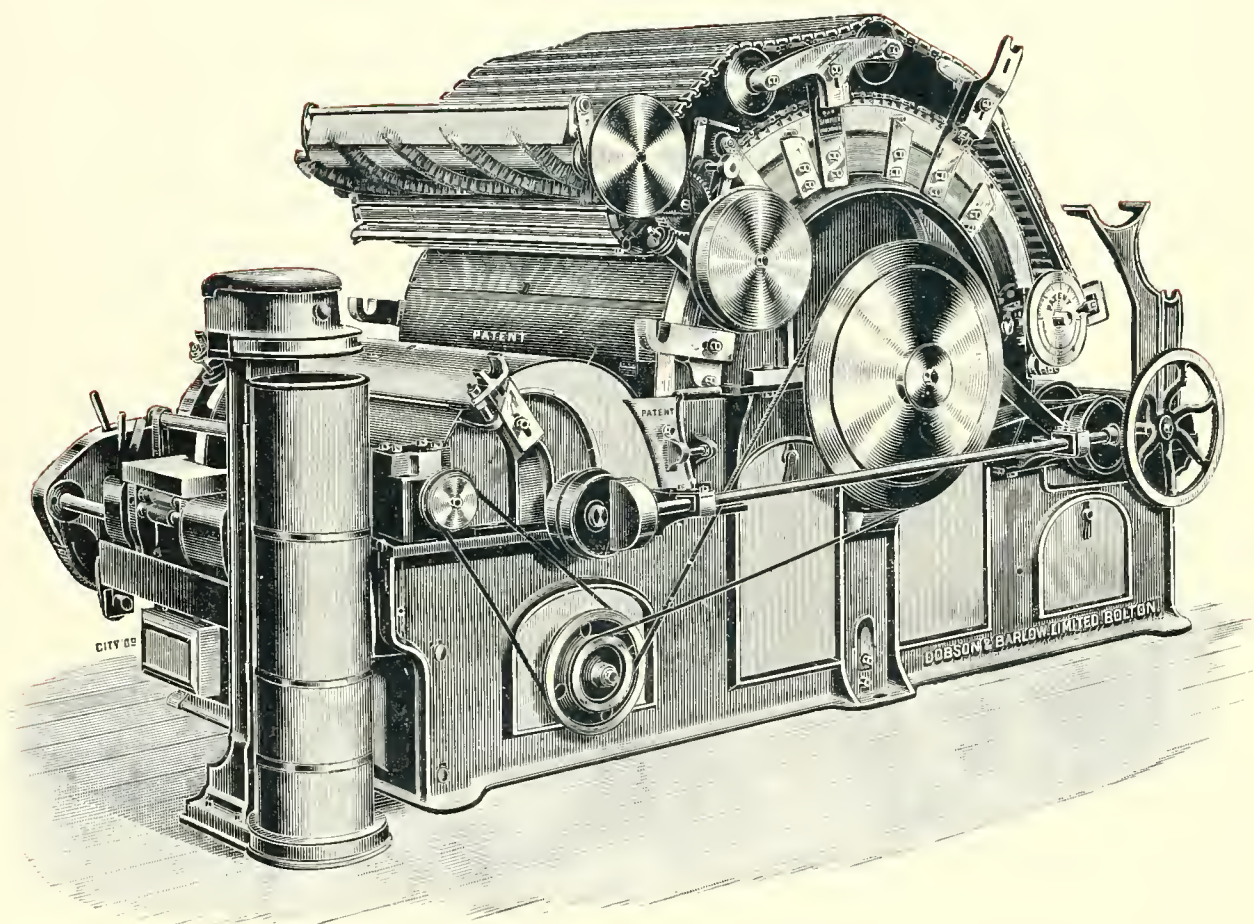
WIRE BURNISHING BRUSHES.

(One required for 30 Cards)

BRISTLE STRIPPING BRUSHES.

(One required for 30 Cards)

PATENT IMPROVED "SIMPLEX" REVOLVING FLAT CARDING ENGINE.



The Revolving Flat Card is now in universal demand, and can be used to advantage for all classes of cotton.

It is made different widths on the wire, and the most usual diameter of the cylinder is 50 in., with a 24 in. doffer and a 9 $\frac{3}{4}$ in. taker-in.

The Card illustrated has a 50 in. cylinder with 109 or 110 flats, 1 $\frac{3}{8}$ in. broad, 44 of which are constantly at work.

The setting of the Flats is one of the most simple and important improvements in this card, and is entirely automatic. What other makers endeavour to accomplish with from five to seven separate adjustments on each side, we accomplish with one. The Flats can be adjusted to the smallest fraction of an inch by the turn of a setting handle on each side of the Card, and the amount of the adjustment is shown upon a self-indicating dial which registers a variation to the 2,000th part of an inch. The whole apparatus is arranged to be kept under lock and key. The advantage of this method of setting will be recognised by every Overseer having a large number of Cards under his charge. Absolute certainty is also ensured that every flat is concentric with its cylinder and does its proper share of work. Better results are thereby obtained and less attention required.

The concentricity of the Flats with the cylinder is bound to be accurate on account of the mathematical perfection with which the flexible and the brackets upon which it rests are made. In addition to this, each flexible is tested on its whole surface in every possible position it can assume by an apparatus which denotes a variation to the 1,000th part of an inch, before the Card leaves the works. The cylinder and doffer are clothed up to the extreme edges, and the cylinder fits close up to the bends—the latter being turned on the inside—thus absolutely preventing all draughts; there are also flanges and other protections to prevent damage being done to the edges of the Card wire. By these and other improvements perfect selvages are made, and an extra width of lap can be worked in the same floor space. Cards were formerly made 2 ins. wider on the wire than the width of the lap to be worked, but our “Simplex” is made one inch **narrower** on the wire than the width of lap to be worked, thus, by this and other arrangements, economising very considerable floor space; in fact, a floor space of 10 to 11 inches in width is gained in our “Simplex” Card over the former kind of Cards.

The Flats are covered with wire their whole length, except just their bearing surfaces. The Flats are very strong, and are made from specially designed patterns. They are as short as it is possible to make them for the width of the Cylinder. They are trued up by special apparatus to the 1,000th part of an inch, and are clothed in the most effective and accurate manner, by the patent continuous clamp or by rivets, the

former of which entirely protects the edges of the foundations of the flat sheets, and prevents them from fraying. With the Patent Clamp there is also less accumulation of fly or fluff, and the flat sheets are uniform throughout in their tension, being stretched their whole length simultaneously.

In addition we offer many other important advantages :—

The Taker-in is covered with inserted saw-tooth wire, 6, 8, or 10 coils to the inch, according to the quality of cotton to be worked. It is always clean, requires no grinding, and the ends are well shielded to protect the wire from damage.

One Fluted Roller with Dish Plate, or two Feed Rollers either fluted or otherwise.

One of the greatest and most important features of this Card, as the following combinations will show, is the simple and accurate manner in which the Taker-in and all its connections are arranged to be set simultaneously with one adjustment ; also the simultaneous setting of the Doffer Cover and all other connecting parts. The Taker-in pedestals have been so perfected as to make collection of fly and leakage of oil from the bearings absolutely impossible.

The patent combined adjustments of the taker-in and its adjacent parts, namely :— the mote knives, the taker-in undercasing, the back half of the cylinder undercasings, the top steel knife or back cover covering that part of the cylinder between the taker-in and the flats, the steel taker-in cover, and the top clearer, are set or adjusted simultaneously with the taker-in. When necessary, the undercasings and mote knives can be independently adjusted. These facts not only tend to lessen the work of the attendants, but also guarantee much better results.

The patent combined adjustment of the doffer cover, front knife or fly plate between the flats and the cylinder, and the front half of the cylinder undercasing—this is accomplished by means of the combination of the bend nose with a circular trued segment, all of which are adjusted simultaneously.

The Doffer Grinding Brackets are attached to the doffer pedestals, so that the grinder cannot get the grinding rollers cross wound.

All the adjustments of the taker-in and its connections, the doffer and its connections, together with the grinding brackets are made by means of compound screws of different pitches, which ensure a perfect and finer adjustment, entirely dispensing with back lash.

A sheet iron division with door is provided between the cylinder and taker-in, to keep the waste separate from each.

A further important improvement in this Card is the patent cylinder and doffer cover with making-up piece combined; this is made of polished steel inside and out, hinged together and arranged on the concentric principle. It is adjustable according to the wear or length of card-wire, and it dispenses with the necessity of removing the covers when stripping and grinding; for this operation, the hinged part of the cover next to the cylinder is turned down, and to insert the Setting Gauge between the cylinder and doffer the whole appliance is moved eccentrically over the doffer and retained by a catch in a notch. That part which descends between the cylinder and doffer is planed to a knife edge and polished so as to prevent cotton from clouding or forming "eat tails." This combination makes up the space between the cylinder and doffer, and is an absolute preventive of air accumulations or the blowing out of waste or loose fibres; the Card Room is consequently kept in a much more clean and healthy state.

Only one Bracket is required for the stripping brush and grinding roller, and it is made to admit of a phosphor bronze bush which is loose on the shafts of the grinding roller and stripping brush.

Patent Self-lubricating Doffing Comb Motion, permitting the highest speed without vibration. No escape of oil. Perfect lubrication.

Calender Rollers or Draw-box at the delivery.

Much has been said about adjustable pedestals for keeping the cylinder in its true centre. We have a patent adjustable pedestal which is mathematically correct; it can be adjusted in any direction laterally or vertically,

and is admitted by all who have tried it to be undoubtedly superior to any other method for maintaining the concentricity of the cylinder with that of the flexible bend; it is simple, solidly made, easily worked, most durable, no wear and tear, and cannot get out of order. If at any time it is desirable to know whether the cylinder shaft is in its true centre with the flexibles, there is a template supplied to prove this fact, and if the template will not fit the exterior pedestal bush, the bushes must be adjusted until it will; when it does, the cylinder is absolutely mathematically concentric with the flexible bends.

The Cylinders and Doffers are trued up on the whole of their surfaces by emery wheels, and are balanced at high speeds by special apparatus which indicates an irregularity of less than one quarter ounce.

All Pulleys are balanced.

Doffer driven from taker-in and taker-in from cylinder, from opposite sides of the Card.

The finish of the Machine throughout is of the highest class, the different parts are made to templates and finished by machinery, ensuring the greatest possible accuracy, perfect freeness in working, and the least possible driving power.

Any kind of clothing can be used as may be considered the most suitable for the special requirements of the cotton.

Less room in width required by this Card.

Space occupied by a Card 37 in. on the wire, to work a lap 38 inches wide, cylinder 50in. dia. :— 10ft. 0in. \times 5ft. 2in.

Production from 60lbs. to 250lbs. per day, according to the quality and kind of cotton.

Weights :—Gross 65 cwts. Net 50 cwts. Cubic measurement 254 feet.

THIS CARD COMPRISES THE FOLLOWING SPECIALITIES :—

The only perfect cylinder adjustment.

- „ „ automatic setting of flats. Flexible bend mathematically correct at all stages of the wire.
- „ „ automatic and combined adjustments of working parts.
- „ „ knives and covers.
- „ „ automatic adjustment of undercasings.
- „ „ system of clothing.

Perfect selvages.

- „ self-lubricating comb motion.

Total absence of “Fly,” accounted for by the suppression of draughts.

Guaranteed accuracy of all parts.

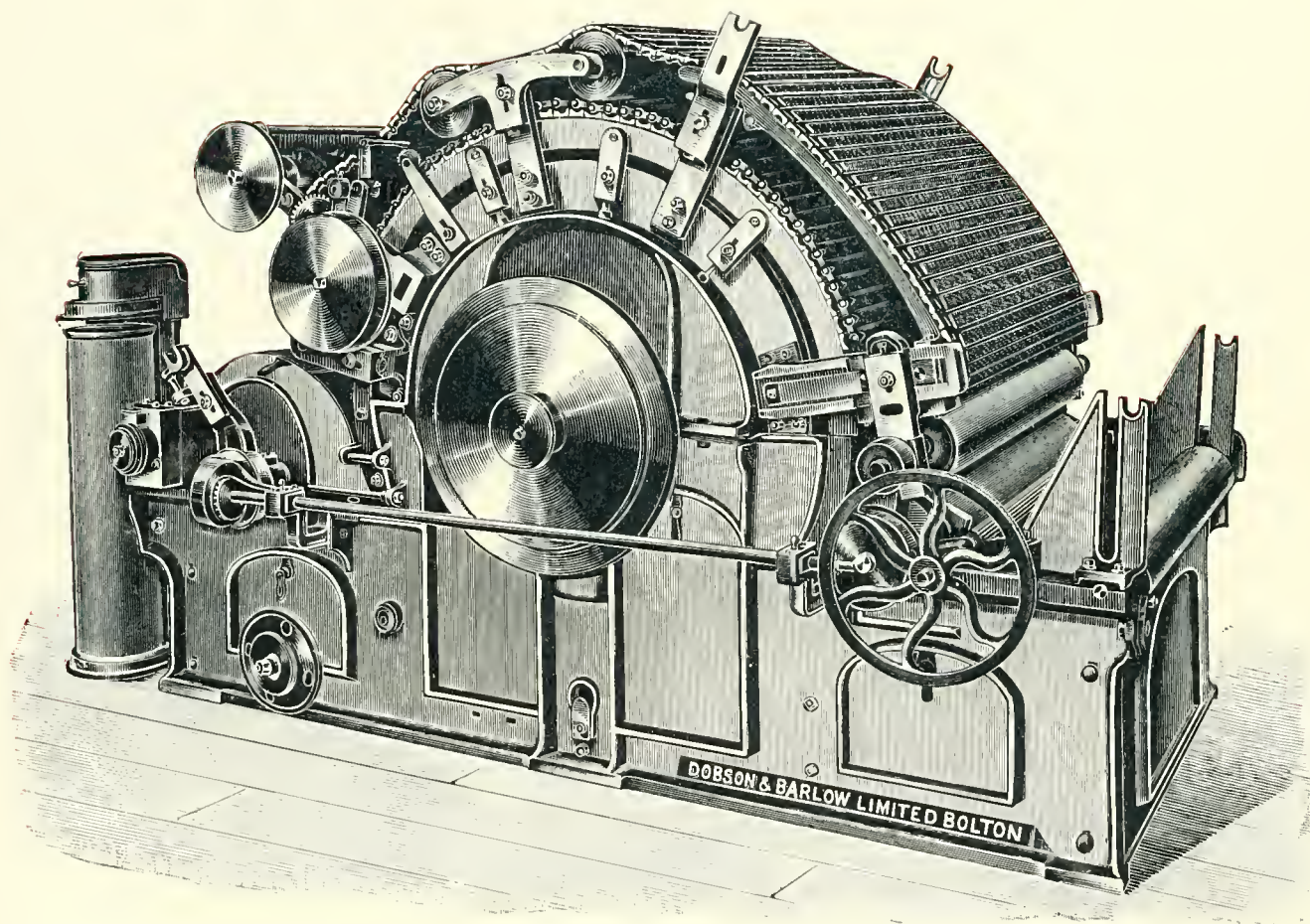
Economy in number of Engines.

- „ „ floor space.
- „ „ attention.
- „ „ oil, waste, &c.
- „ „ driving power.

Increased production.

Improved quality of yarn from cheaper cotton.

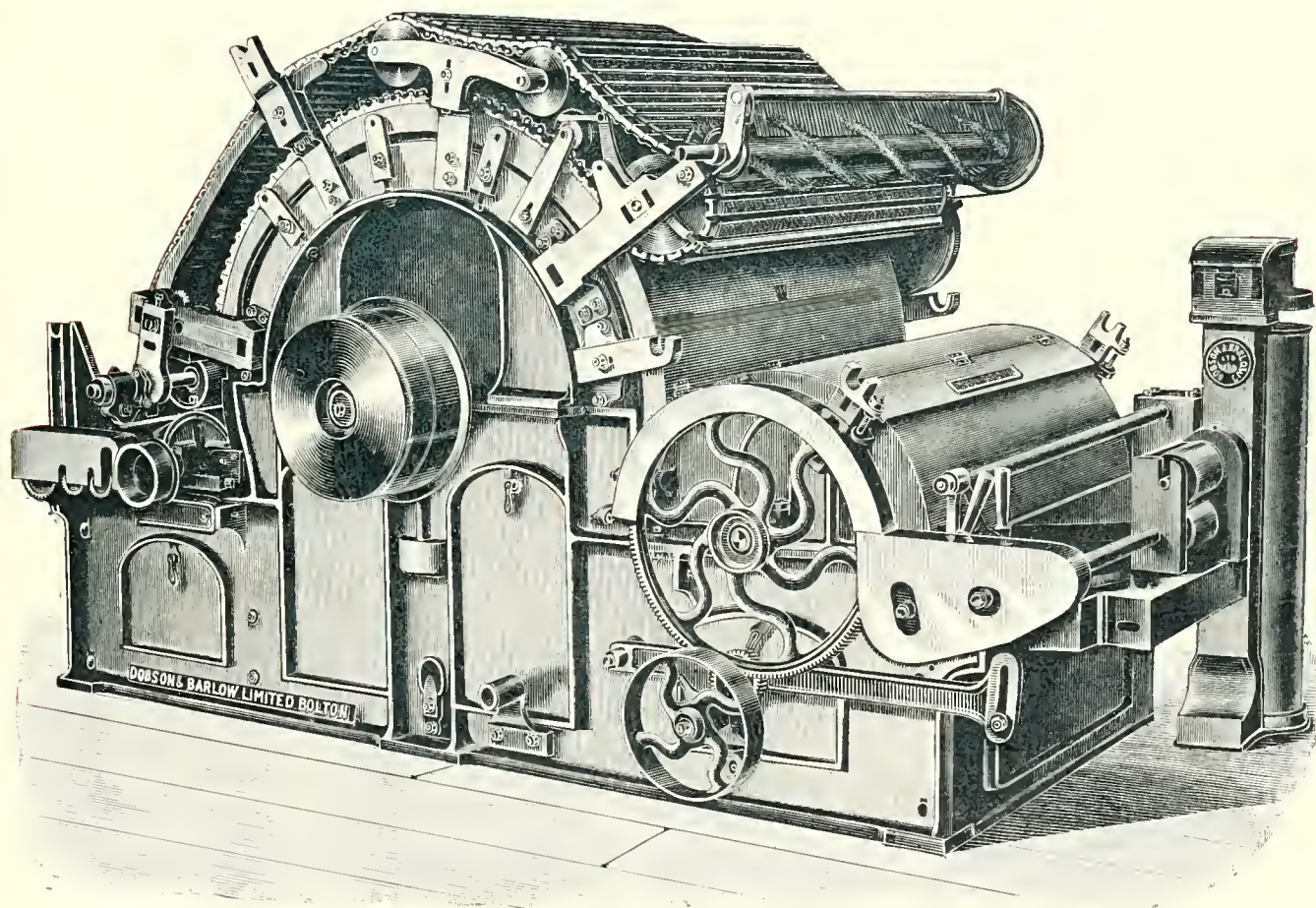
PATENT IMPROVED REVOLVING FLAT CARDING ENGINE.



This Card is made all usual widths on the wire, and has a cylinder 50 in. diameter, doffer 24 in. diameter, taker-in $9\frac{3}{4}$ in. diameter, and 109 or 110 flats, $1\frac{1}{2}$ in. broad, 44 of which are constantly at work.

It is made from the same framing and with the same bends as the "Simplex" Card ; the same patented arrangements of covers, knives and undercasings, the perfect automatic setting arrangements of the various making-up pieces, the same kind of flat, and the general appearance is almost identical with

that of the "Simplex" Card. The only difference being that the flexible bend is set in five places instead of one place as in the "Simplex" Card. The bend is, however, an important advance upon the old form of flexible with the five setting points, and although the same number of setting points are retained the method of their connection and adjustment constitute the great improvement that has been effected. The construction is such that the flexible is absolutely free from vibration and perfect rigidity is ensured, the flats resting upon what is practically a solid surface.

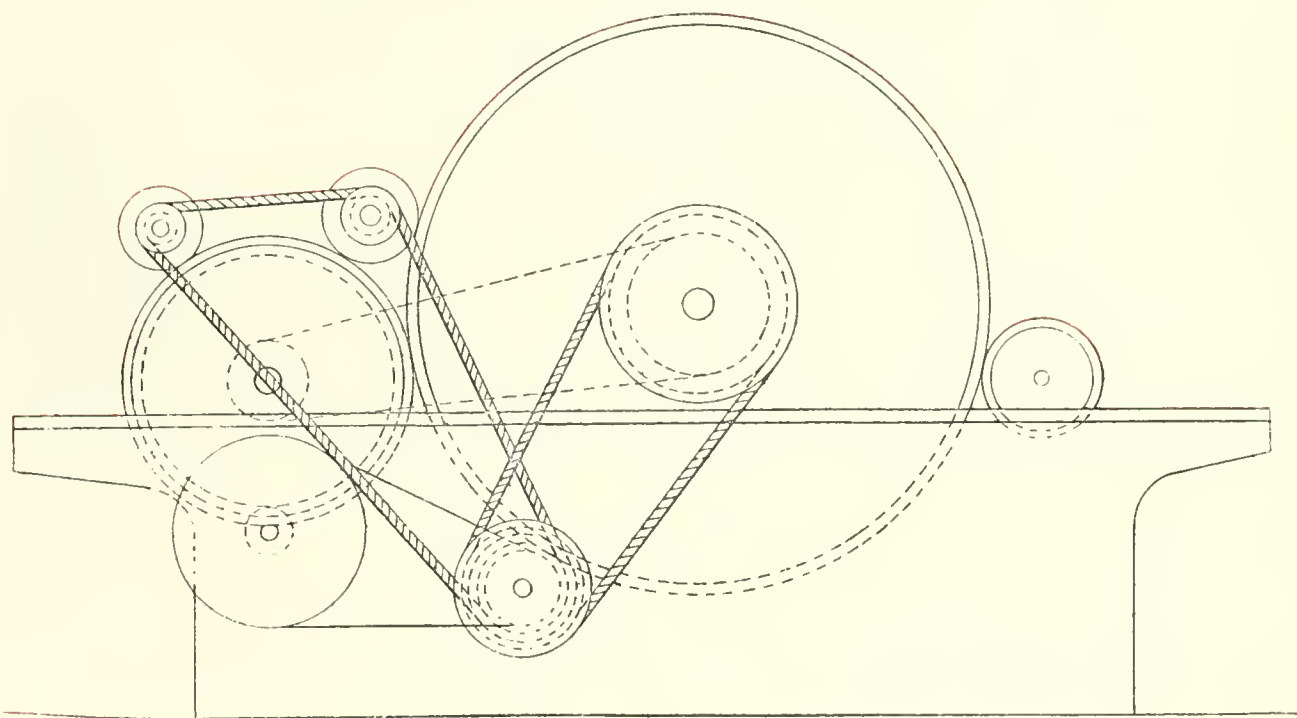


Space occupied by a Card 37 in. on the wire, to work a lap 38 inches wide, cylinder 50in. dia. :—10ft. 0in. × 5ft. 2in.

Production from 60lbs. to 250lbs. per day, according to the quality and kind of cotton.

Weights :—Gross 65 cwts. Net 50 cwts. Cubic measurement 254 feet.

IMPROVED SLOW GRINDING ARRANGEMENT FOR CARDING ENGINES.



When Cards are clothed with hardened and tempered steel wire, what is known as Slow Grinding is sometimes considered desirable. For this purpose a bracket is always applied to each Card. The driving pulleys are also arranged for this, and all that is necessary besides is a stud and a set of counter pulleys, which will suffice for a number of Cards.

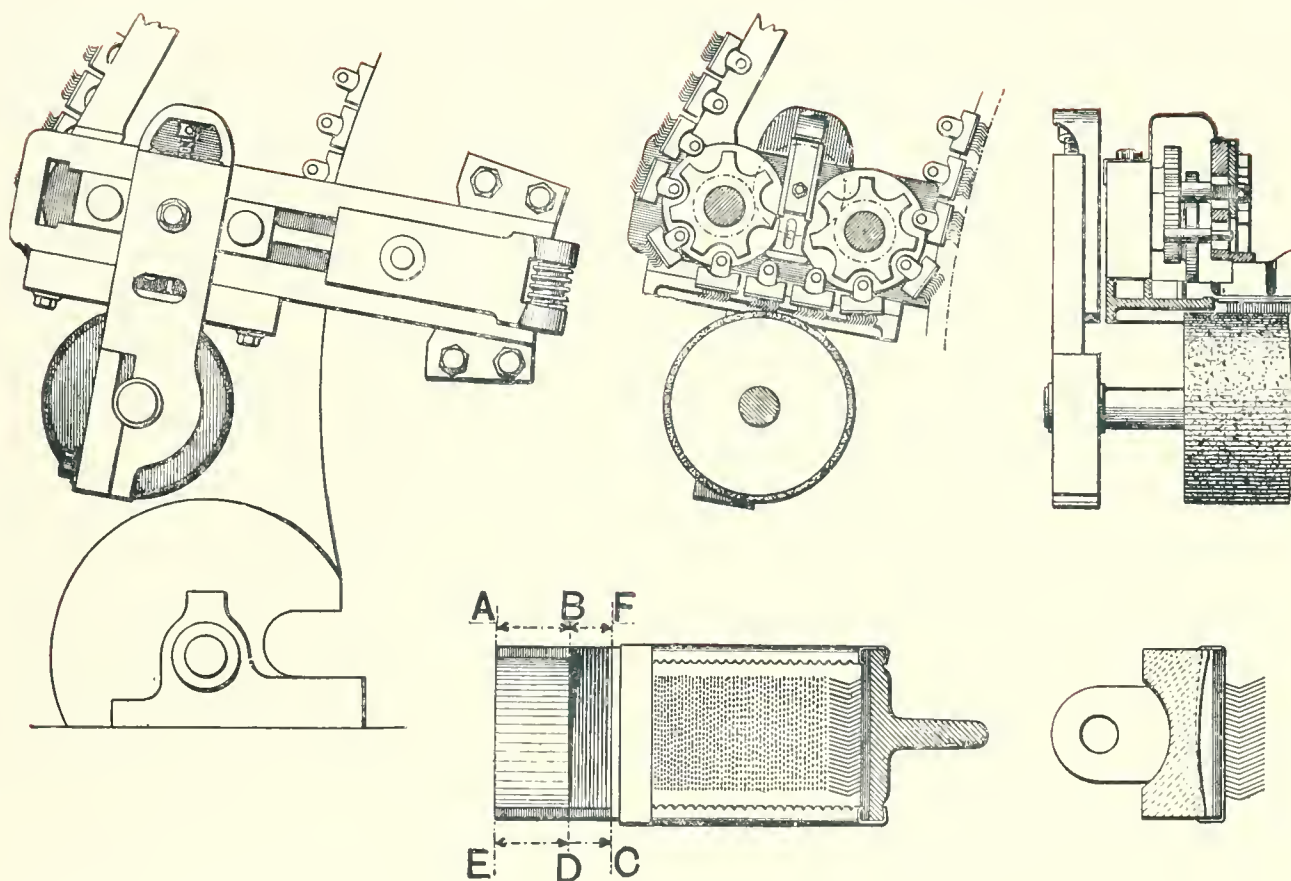
PATENT ANTI-FLEXION FLAT GRINDING FOR REVOLVING FLATS OF CARDING ENGINES.

The constant efforts to improve the accuracy of grinding card flats that have been made for so many years past by mill managers, and overlookers, machine makers and mechanics, show the great importance that is attached to **perfect grinding** by those in the trade.

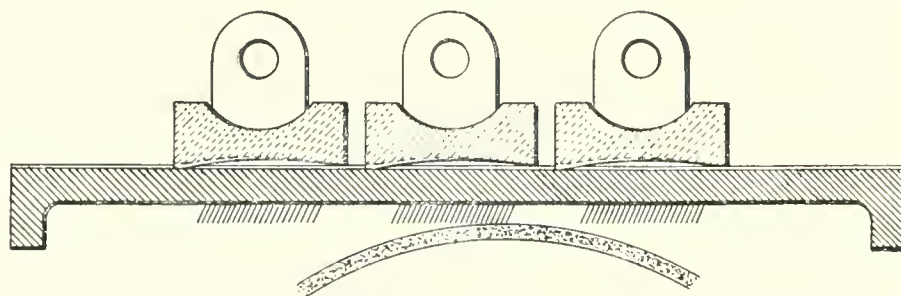
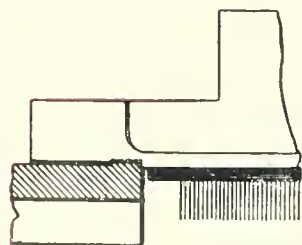
The patents on this subject are so many that it can be said their name is legion, and some of them have done their work in a fairly satisfactory manner. **None of them, however, are perfectly satisfactory**, there being two faults, either one or both of which are shared by all motions up to the present time. Either they have **moving parts** which regulate the angle of the grinding and which are liable to get out of order by wear and tear or dust and dirt,—or, they grind the flat with the wire upwards thus causing the **great inconvenience due to deflection**, which is sufficiently important to prevent the best results being gained from the carding engine when working.

We are extremely pleased to say that we can claim undeniably to have **overcome the whole of the existing objections** and the motion we are prepared to supply has the following advantages over any other.

1. There is **no moving part** in the motion controlling the grinding.
2. The **ordinary** size of **grinding roller** can be used.
3. There is **no movement in the axis of the grinding roller** itself.
4. When the flats are passing over the grinding roller they are subject to **no strain** whatever.
5. When the flats are being ground they have the **wire downwards under the same conditions as their working position**.
6. **Each flat** on the Card is bound to be **precisely the same** as the other flats,—there is no possibility of its being otherwise.
7. Whatever the **wear and tear** on the end of the flats it is **regulated by the grinding roller**.
8. There are **no corners** or shelves for the lodging of **fly or dirt**.
9. The **grinding surfaces** are **automatically cleaned** by the passage of the flats.
10. The Motion requires absolutely **no attention**.
11. **The setting** of the grinding roller is **more readily executed** as the motion is in the **most favourable position** for doing this.
12. **Any dirt** loosened in the flat wire by the vibration of the grinding falls on to the steel cover of the licker-in and **cannot get into the card**.



- A. B. C. D. SLIDING SURFACE WHEN GRINDING.
 A. B. C. E. SLIDING SURFACE WHEN CARDING.
 B. F. CLEARANCE FOR RAISED SURFACE ON SLIDE WHEN GRINDING.



The following is a description of the Motion itself.

At the back of the Card, immediately over the lickering, is fixed a bracket with two surfaces on different levels the difference being that due to the bevel of the flat. Underneath this fixing is attached the grinding roller. There are two bowls conducting the flats so that they pass in a straight line over the grinding roller. At the end of each flat a small part of one sliding surface is cut away for clearance—this allows the flat in passing over the slide previously mentioned to adopt a horizontal position with regard to the flat wire. This means that each flat receives the same treatment under exactly the same conditions, and, as can be seen, it is simplicity itself.

The only possible adverse criticism that can be made with regard to this system is that some small part of the sliding surface of the flat has been taken away. This is perfectly true, but on the other hand the amount is so very small that it cannot have any practical results on the wear and tear of the flats. Further the motion is completely and continuously automatic in the sense that whatever wear and tear may take place the setting and grinding are relatively the same as before so that under no circumstances can any inconveniences accrue from even exaggerated wear and tear of the flat ends. Experiments have shown that it is possible on this apparatus to **grind flats 7 to 10 times more accurately than on the very best system available** up to the present day, and a trial—the more lengthened the better—will clearly show this; in fact the benefit to be derived from this motion has the advantage of increasing as the Cards get older instead of, as is invariably the case in **other Cards, the machine becoming nearly useless after some years wear.**

It would be difficult to name an invention which may have a more important bearing on successful Carding than the one described, in spite of its extreme simplicity.

We most unhesitatingly state and are prepared to prove that this arrangement of grinding has an overwhelming advantage over any motion offered or known by the trade. One great difference between Cards with the **Anti-Flexion Motion** and all others is, that however well these Cards may start they are from natural reasons **forced to do better and better as time goes on**; whereas, however well **all other Cards** may work when first started they are bound by the same natural reasons to **become more irregular and incorrect** the longer they work.

This Motion can be adapted to Cards of other makes than our own, as a rule with very little trouble.

PATENT FLAT GRINDING APPARATUS.

(M^cCONNEL & HIGGINSON'S PATENTS ADAPTED AND IMPROVED.)

In the ordinary method of grinding the revolving flats of Carding Engines, the flats are supported on special facings at their back, giving the wires their necessary inclination to the cylinder and the requisite length. It is evident that by this method any unequalled ties in the inclinations of these facings to the working surfaces of the flats, or in the distances between these surfaces, will result in different lengths and bevels of wires.

These drawbacks are entirely obviated by this Patent Grinding Apparatus, as the flats are supported on their working surfaces, and each flat receives its angle by means of one and the same wedge, so that inequalities in the wear of the working surfaces of the flats cannot produce any difference in the length or bevel of the wire, whilst the labour of preparing special grinding surfaces at the back of the flats becomes of little or no significance.

This arrangement will readily be understood by means of the illustrations Figs. 1 & 2.

To the grinding bracket A a grooved guide B is fixed in which a toothed bar C can slide. To the bottom of this bar is attached a wedge curved to the radius of the flexible bend. The flats D are pressed with their working facings against this wedge by means of the lever E and slide E¹, the other end F being loaded by a weight or spring. As the flats revolve each of them seizes the projection G of the wedge and carries it along until the wires have passed under the grinding roller H. The flat in its forward travel comes into contact with an incline attached to the back of the guide B which presses the flat down and so releases the wedge, and by means of the weighted toothed segment J it is returned to its original position in readiness for the next flat. The accumulation of fluff or dirt on the working surfaces is entirely avoided by these surfaces being on the underside of the guide B. By changing or altering the wedge the bevel of the wire can easily be altered if required.

Fig. 3 shows the Grinding Apparatus in position on the Card.

This grinding motion can be applied to any revolving flat cards.

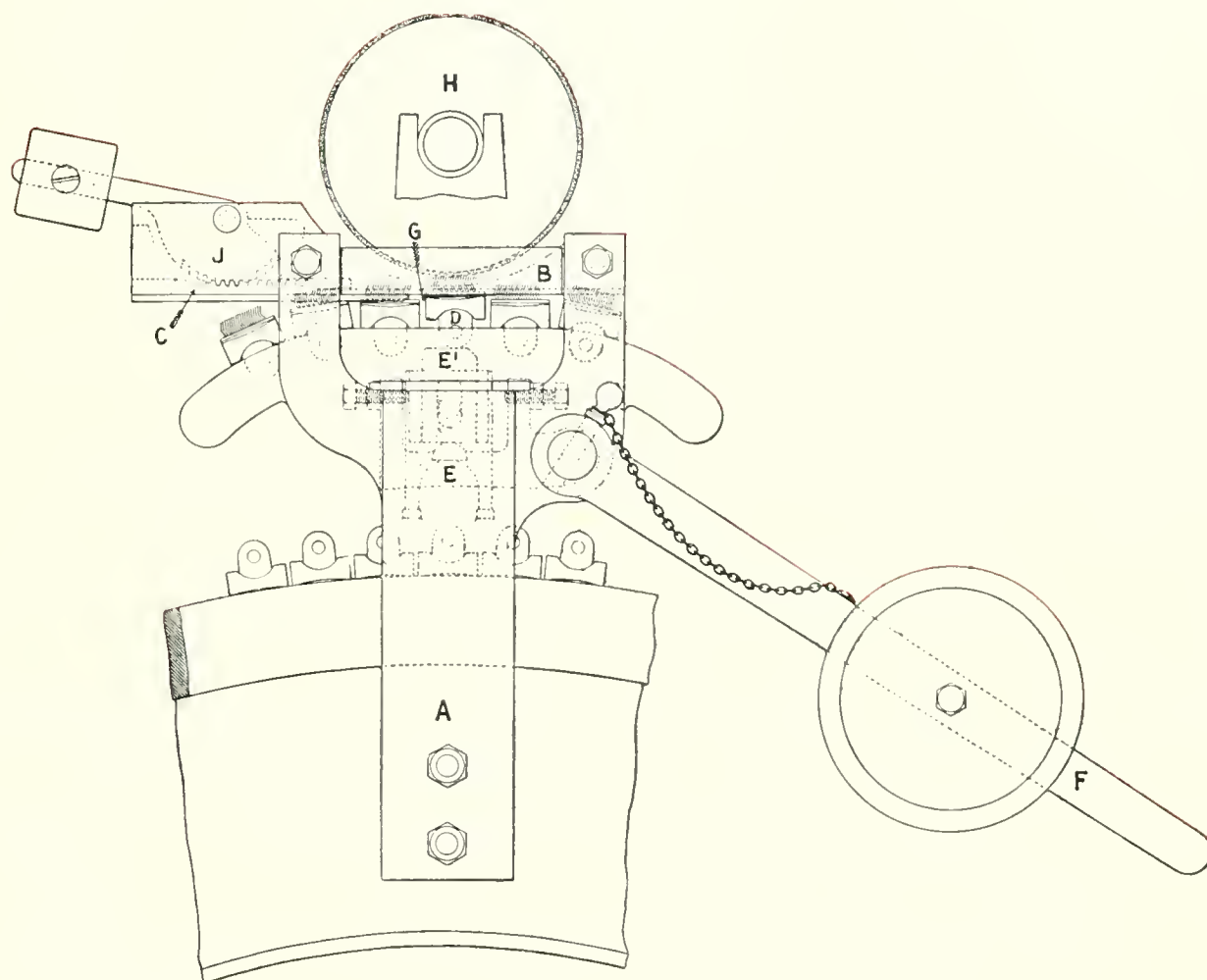


FIG. 1.

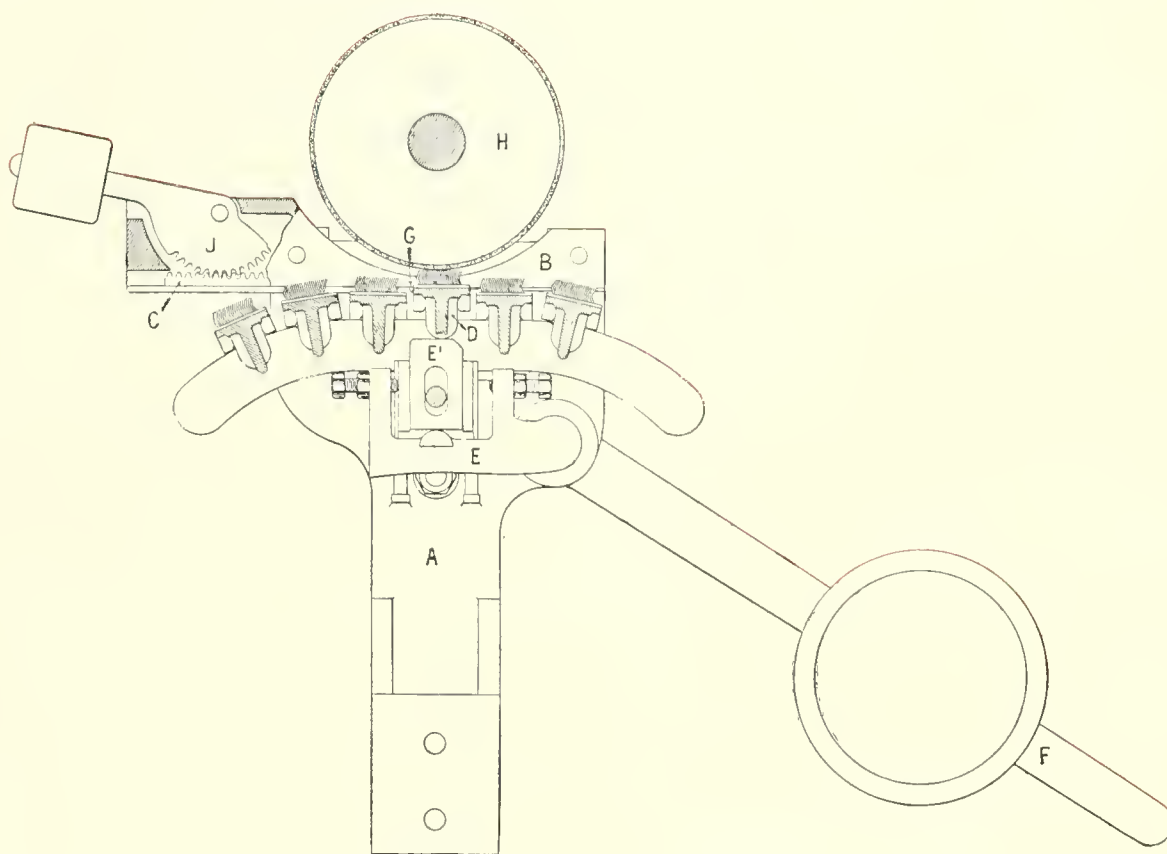


FIG. 2.

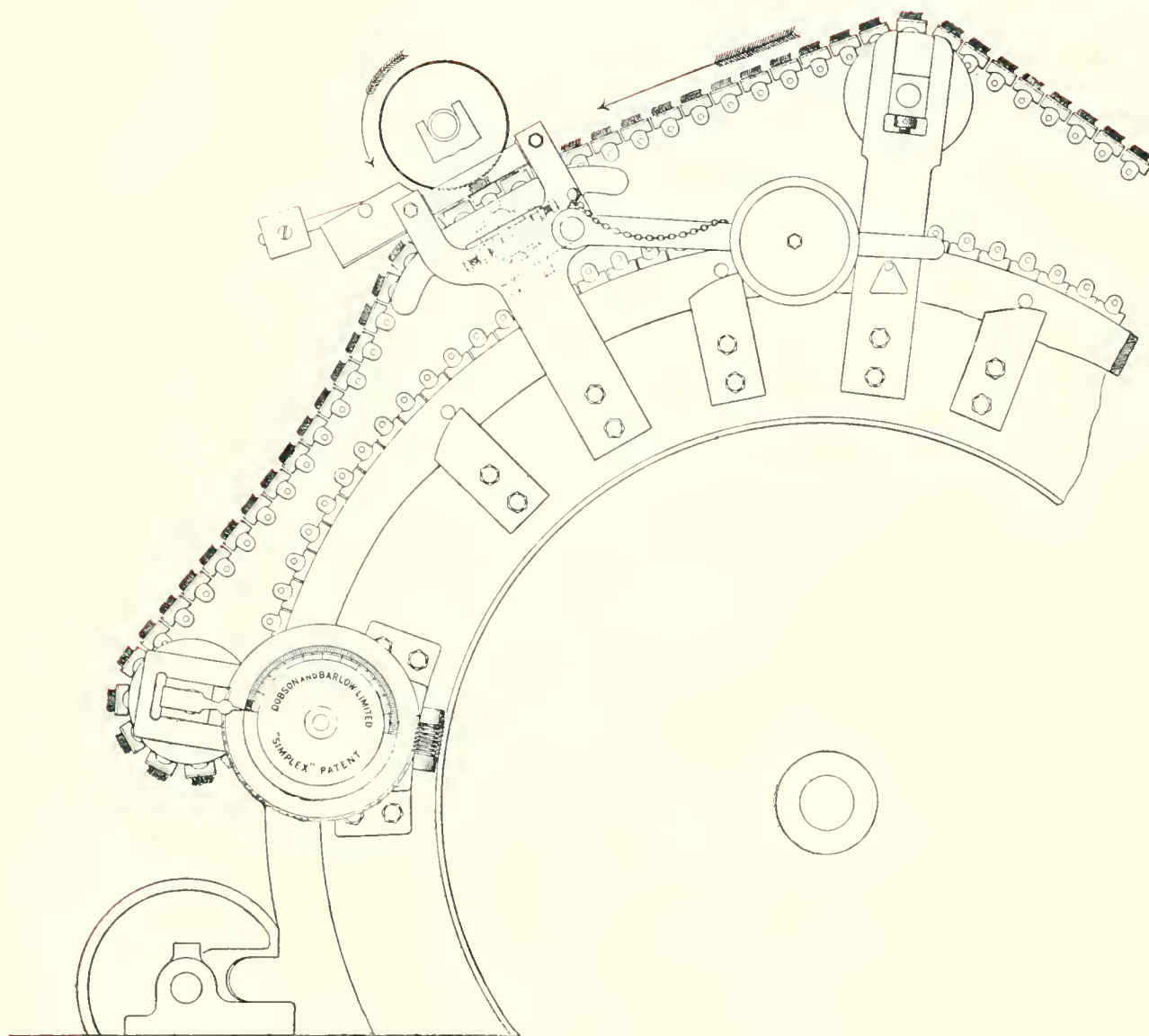


FIG. 3.

IMPROVED GRINDING MACHINES

To grind one roller or one clearer at a time.

„ „ two „ two „ „

„ „ four „ four „ „

„ „ one “Wellman” flat and one roller or one clearer at a time.

„ „ two „ „ two „ two „ „

„ „ two „ flats only at a time.

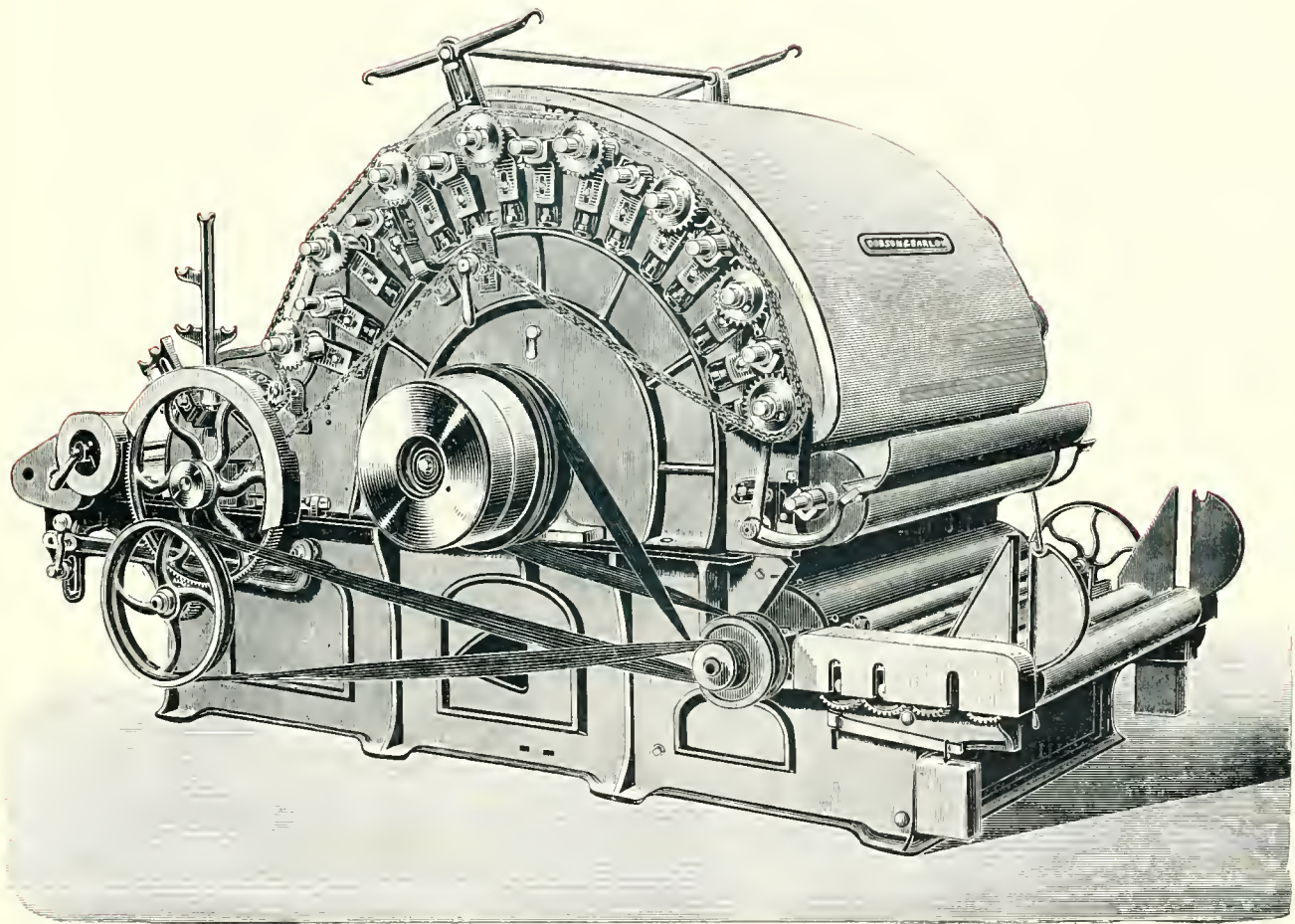
„ „ three „ „ „ „

IMPROVED GRINDING MACHINE

TO GRIND THREE REVOLVING IRON FLATS AT A TIME.

CARDING ENGINE

WITH ROLLERS AND CLEARERS.



This kind of Carding Engine, as is well known, is principally used for low classes of cotton, where quantity is preferred to quality, and where the amount of waste made must be kept within the narrowest limits.

It is made with a cylinder 50 in. dia., and from 37 in. to 51 in. wide on the wire ; the Rollers, Clearers, Fancy Rollers, and Dirt Rollers vary in number and diameter according to requirements. The Card illustrated has a cylinder 50 in. dia., doffer 24 in. dia., taker-in $9\frac{3}{4}$ in. dia., 8 rollers 5 in. dia., 7 clearers 3 in., dia., and 1 dirt roller 8 in. dia., automatically stripped by comb.

The Card possesses many important features amongst which the following may be mentioned :—

The Polished Cast Iron Shells to fit on the roller and clearer ends have oil guards or shields to prevent the oil from travelling upon the surfaces of the rollers and spoiling the wire. They also prevent the cotton from lapping round the ends of the rollers.

Shafts work in phosphor bronze bearings.

Polished wood Covers over cylinder and doffer, and polished steel covers over the taker-in. Loose steel moulds or making-up pieces to fill up any space between the cylinder and doffer, between the taker-in and dirt roller, and between the dirt roller and first carding roller or clearer. Absolute preventive of accumulations and the escape of fly, &c.

Special arrangement for varying the speed of the rollers to suit different classes of cotton.

Improved arrangement for setting the cylinder and taker-in undercasings, also the taker-in cover and knives together or separately.

The Taker-in is covered with inserted saw-tooth wire, 6 or 8 coils to the inch, or more if desired, according to the quality of cotton to be worked. It is always clean, requires no grinding, and is not liable to choke ; the ends are well shielded to protect the wire from damage.

One Fluted Roller with Dish Plate, or two feed rollers either fluted or covered with inserted saw-tooth wire.

The Grate Bars or Knives under the taker-in are made so that their different adjustments can be accomplished in a few moments ; they are attached to the taker-in and as it becomes necessary to set it closer to the cylinder, all the parts come with it and *no independent adjustments are*

necessary. Furthermore, the undercasing of the taker-in and the taker-in pedestals have been so perfected as to make collection of fly and leakage of oil from the bearings absolutely impossible.

The Doffer Grinding Brackets are attached to the doffer pedestal so that the Grinder cannot get the grinding roller cross wound.

Patent simplified Self-lubricating Doffing Comb Motion, highest speeds attained, no escape of oil. Each comb is tested for two days at a speed of 1,700 revolutions per minute before being sent out.

The Cylinders and Doffers are trued up the whole surface by emery wheels, and are balanced at high speeds by special apparatus which indicates an irregularity of one quarter ounce.

All Pulleys are balanced.

Doffer driven from taker-in and taker-in from cylinder, from opposite sides of the Card.

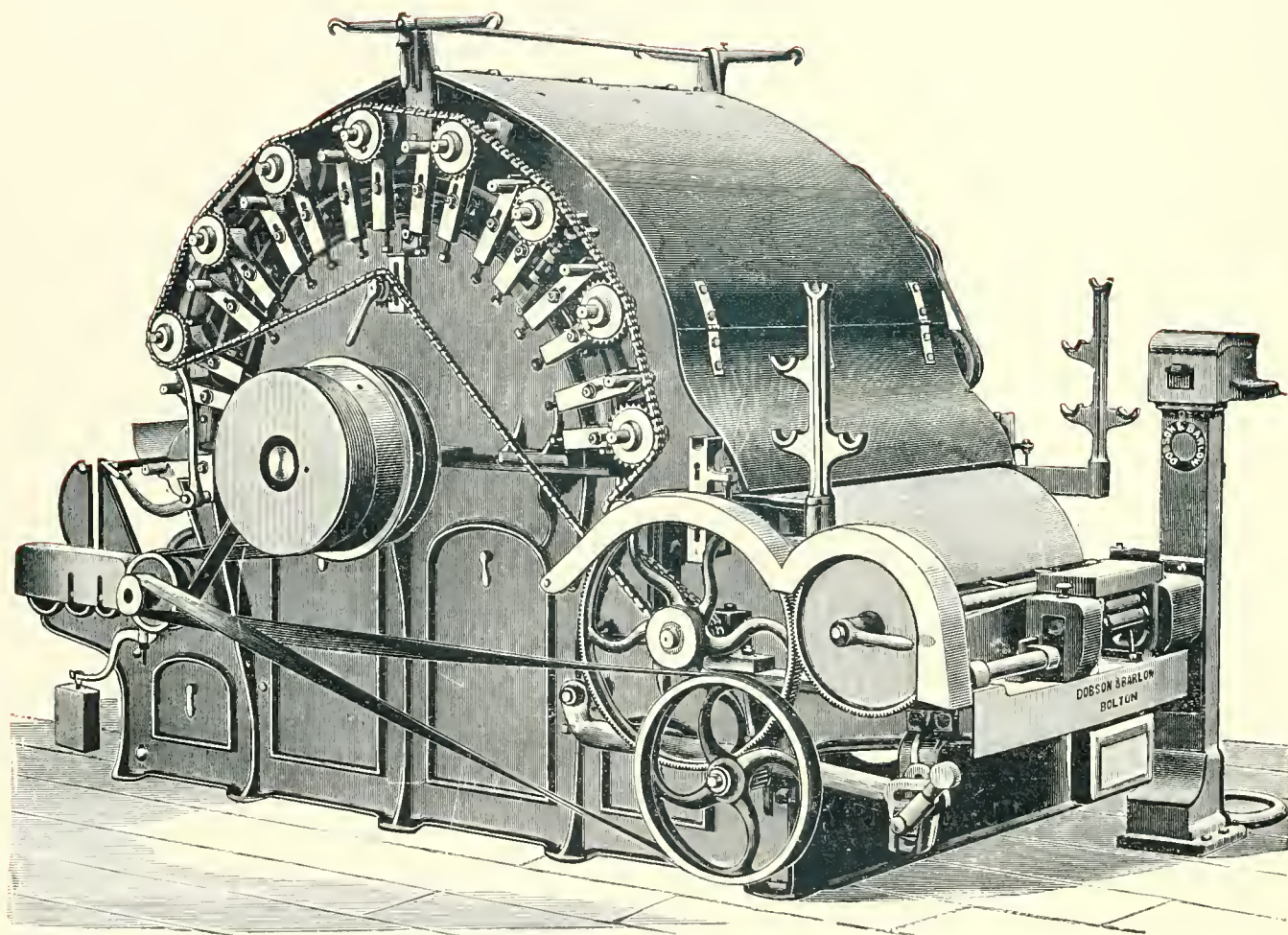
The finish of the Machine throughout is of the highest class, the different parts are made to templates and finished by machinery, ensuring the greatest possible accuracy, perfect freeness in working, and the least possible driving power.

Any kind of clothing can be used that may be considered the most suitable for the special requirements of the cotton.

Space occupied by a Card 37 in. on the wire, cylinder 50 in. dia.:—10 ft. 0 in. × 5 ft. 7 in.

Production from 120 lbs. to 200 lbs. per day, according to the quality and kind of cotton.

Weights:—Gross 65 cwt. Net 48 cwt. Cubic measurement 287 feet.



CARDING ENGINE WITH ROLLERS AND CLEARERS, ON THE CONCENTRIC
BEND PRINCIPLE.

CARDING ENGINE

WITH ROLLERS AND CLEARERS, ON THE CONCENTRIC
BEND PRINCIPLE.

This Card is practically the same as the Card described on page 49 with the exception of the following particulars :—

The Roller and Clearer brackets can be made on our improved adjustable differential setting-screw principle, or on the principle of setting with lock nuts.

Each Bracket can be easily and accurately adjusted, allowing the rollers and clearers to be set to the greatest possible nicety.

The Bends are turned and trued up on the inside surfaces, and the cylinder working close up to them dispenses with linings or packings. All spaces or openings are entirely made up and accumulations with the consequent risks of fire dispensed with.

The Card illustrated has a cylinder 50 in. dia., doffer 22 in. dia., taker-in $9\frac{1}{2}$ in. dia., 8 rollers 5 in. dia., 8 clearers 3 in. dia. and 1 dirt roller 8 in. dia. automatically stripped by comb.

Space occupied by a Card 40 in. on the wire, cylinder 50 in. dia:—9 ft. 8 in. \times 5 ft. 7 in.

Production from 120 lbs. to 200 lbs. per day, according to the quality and kind of cotton.

Weights:—Gross 65 cwts. Net 48 cwts. Cubic Measurement 287 feet.

CARDING ENGINES

WITH "WELLMAN" OR STATIONARY IRON FLATS.

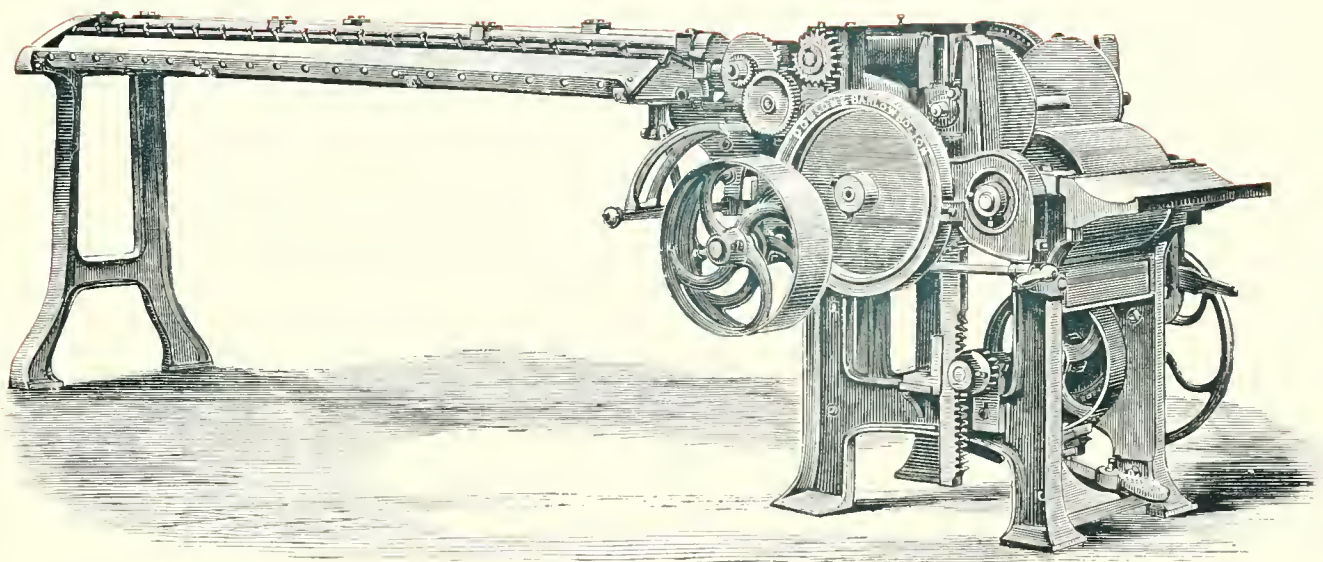
DOUBLE CARDING ENGINES

Rollers and clearers can be put upon both cylinders, or the first cylinder can be covered with rollers and clearers, and the second with flats; or both cylinders can be covered with either stationary iron flats, or revolving iron flats.

CARDING ENGINES

For Waste and Vigonia Yarn, with Lattice Feeder or Hopper Feeder; and with Coilers, Condenser, or any other kind of delivery arrangement.

DERBY DOUBLER.



This Machine is similar in construction to the Sliver Lap Machine described on page 57, with the exception that it is usually made 18½ in. wide and with a long table, as illustrated, for 60 Cans or Slivers.

It is designed to make laps for Carding Engines where two passages of carding are required. The Slivers from the first or breaker card are passed through this Machine and made into a lap, and two of these laps are then placed behind the Finisher Card.

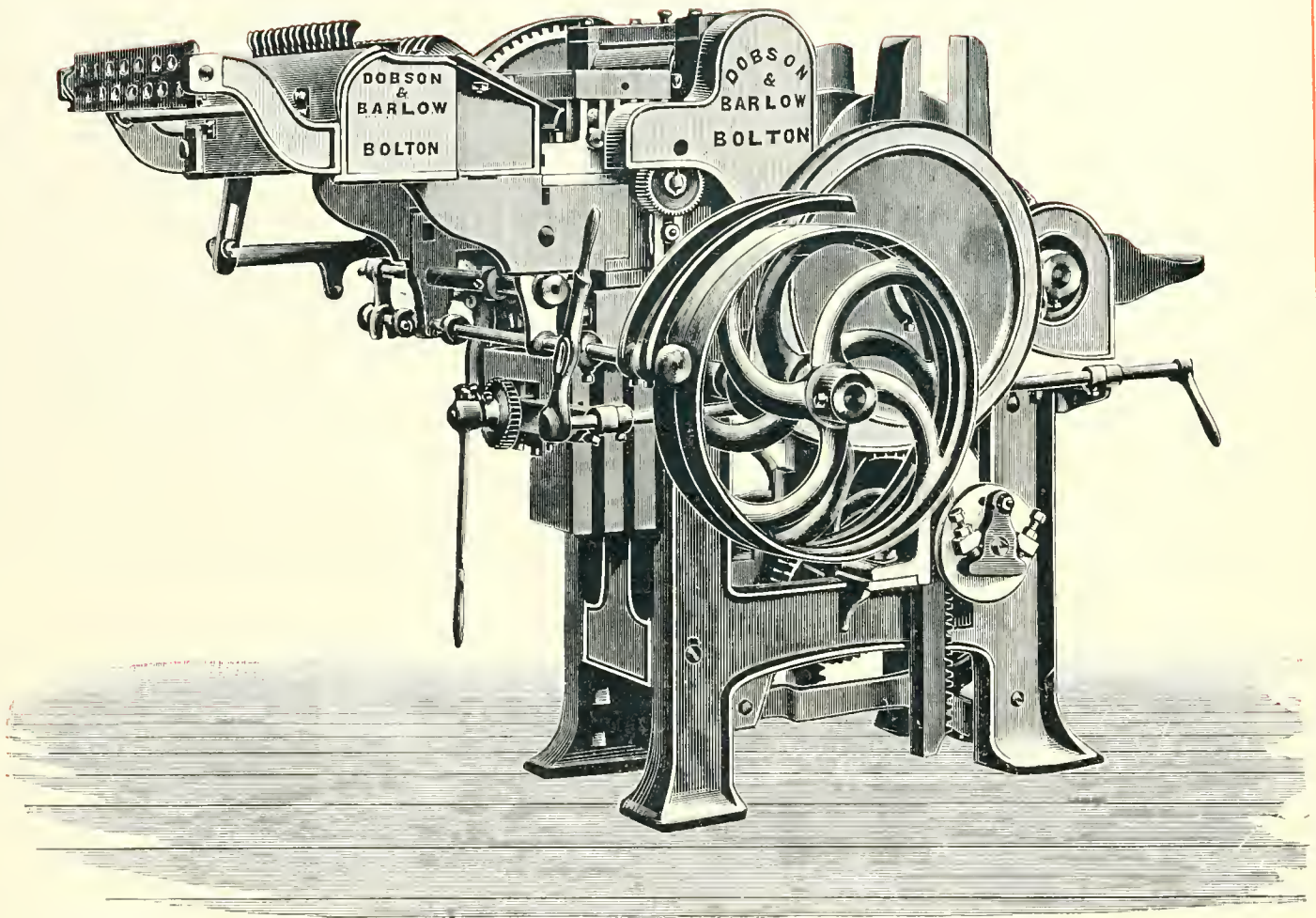
When short stapled cotton is used a pair of calender rollers with a stop motion to each Sliver, is placed on each side of the table to assist the Slivers in their passage from the cans to the guide plates.

Measuring Motion is also applied to this Machine by which means the laps are all made the same length.

Production from 1,500 lbs. to 1,600 lbs. per day.

Space occupied :—17 ft. 6 in. × 5 ft. 0 in.

Weights and Cubic Measurement :—Gross 43 cwts. Net 35 cwts. 119 Cubic feet.



IMPROVED SLIVER LAP MACHINE WITH STOP MOTION.

IMPROVED SLIVER LAP MACHINE

WITH STOP MOTION.

The object of this Machine is to unite in a sheet or lap a given number of Slivers or ends from the Carding Engine, and make them into a lap for the Comber, or for the Draw Frame and Patent Ribbon Lap Machine Combined, where they have this Machine.

From 16 to 20 Card Cans are placed behind the Machine and the Sliver is drawn from them through guides to a draw-box consisting of three top and bottom rollers arranged with a certain amount of draught; from these rollers the cotton passes between a pair of calender rollers which press the fibres sufficiently to form them into a fleece or sheet, and this sheet is wound on to a bobbin which turns between two iron revolving plates; these plates keep the selvages of the lap perfectly even and uniform, being free from the friction of stationary plates. When the laps are taken direct to the Comber, they are made exactly the width required by the Comber, which varies from $7\frac{1}{2}$ in. to $10\frac{1}{2}$ in., but when they are made for the Patent Ribbon Lapper they are required to be 1 inch narrower to allow for spreading in the drawing.

As it is necessary that the laps made on this Machine should be perfectly uniform there is a stop motion to each Sliver which instantly stops the Machine when an end breaks.

When the Patent Ribbon Lap Machine is not used, the Slivers are taken from the Card and put through one process of ordinary drawing, and the Slivers from the drawing are then put through the Sliver Lap Machine and made into a lap for the Comber.

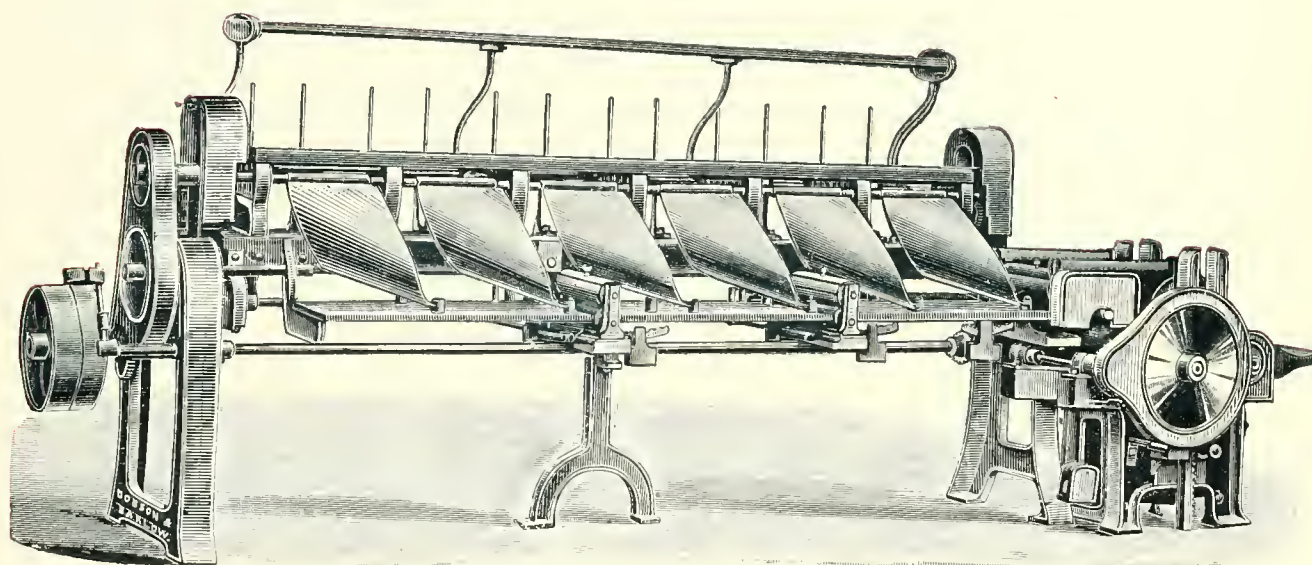
Production from 450 lbs. to 500 lbs. per day.

Space occupied :—8 ft. 0 in. × 4 ft. 6 in.

Weights and Cubic Measurement :—Gross 20 cwt. Net 16 cwt. 65 Cubic feet.

PATENT RIBBON LAPPER

OR PATENT DRAW FRAME AND LAP MACHINE COMBINED
FOR PREPARING COMBER LAPS.



The old fashioned process of preparing comber laps has been to take the slivers from the Card, put them through one process of ordinary drawing and the slivers from the drawing were then put through a small Sliver Lap Machine and made into a lap for the comber.

This old process makes a lap that consists of a series of slivers laid side by side and which was not of one uniform thickness but first had a thick and then a thin place. It is obvious that the nipper of the comber cannot act as well upon this lap as if the thickness were uniform throughout, and further, that where the thin places are, there is danger of good cotton passing through into the waste on account of the defective nip. Also where the thick places come the needles are required to do too much work and the quality at once suffers. It is to obviate these difficulties that the Ribbon Lapper has been so universally adopted.

When the Patent Ribbon Lapper is used the system is as follows :—The ordinary style of Drawing Frame before combing is omitted entirely, and the Card Slivers are placed behind a small Sliver Lap Machine and made into a lap; six of these laps are placed in the creel of the Ribbon Lapper and are drawn through four lines of top and bottom rollers in the form of a ribbon instead of a sliver, and by means of curved plates, these ribbons are placed with mechanical accuracy perfectly even and level one upon the other, and are compressed and conveyed by means of calender rollers upon a polished plate to the lap end where they are formed into laps for the Combers.

This Machine having placed all the fibres perfectly straight or parallel and equally distributed the amount of cotton, from two to three per cent. *less* waste is made in the Comber; the cotton is not injured nor torn by the combs, neither are the combs injured nor broken in the effort necessary to straighten crossed fibres, as scarcely any exist. It is stated by users of this Machine that nine Combers will produce the same weight when fed by it as ten Combers fed with the ordinary Lap Machine; but, what is of far more importance to the Spinner, the yarn produced from this Machine is of greater evenness and strength.

The lap is of a true uniform thickness and is the only perfect lap to feed a Comber. The nipper holds it evenly throughout, the combs all have an equal share of work to do, *less* waste is made, broken fibres avoided, and better combing is the result. No extra floor space is required and the production of the Comber is increased.

We confidently recommend this Machine to the consideration of Spinners of combed yarns.

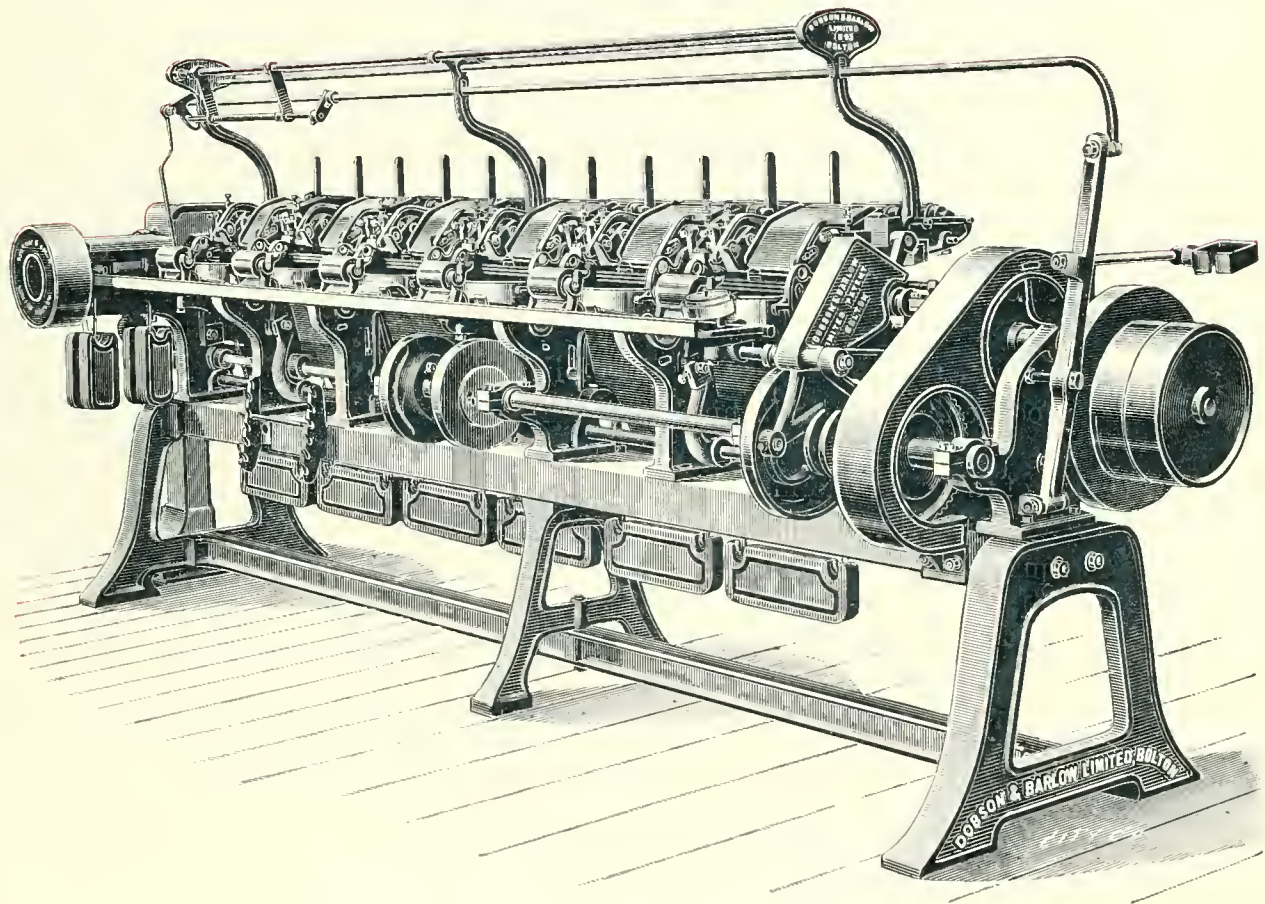
Production from 450 lbs. to 500 lbs. per day, according to the class of cotton to be worked.

Space occupied :—14 ft. 2 in. × 4 ft. 0 in.

Weights and Cubic measurement—Gross 51 cwts. Net 41 cwts. 143 Cubic feet.

PATENT "DUPLEX" COMBING MACHINE

(A. BOURCART'S PATENTS ADAPTED AND IMPROVED.)

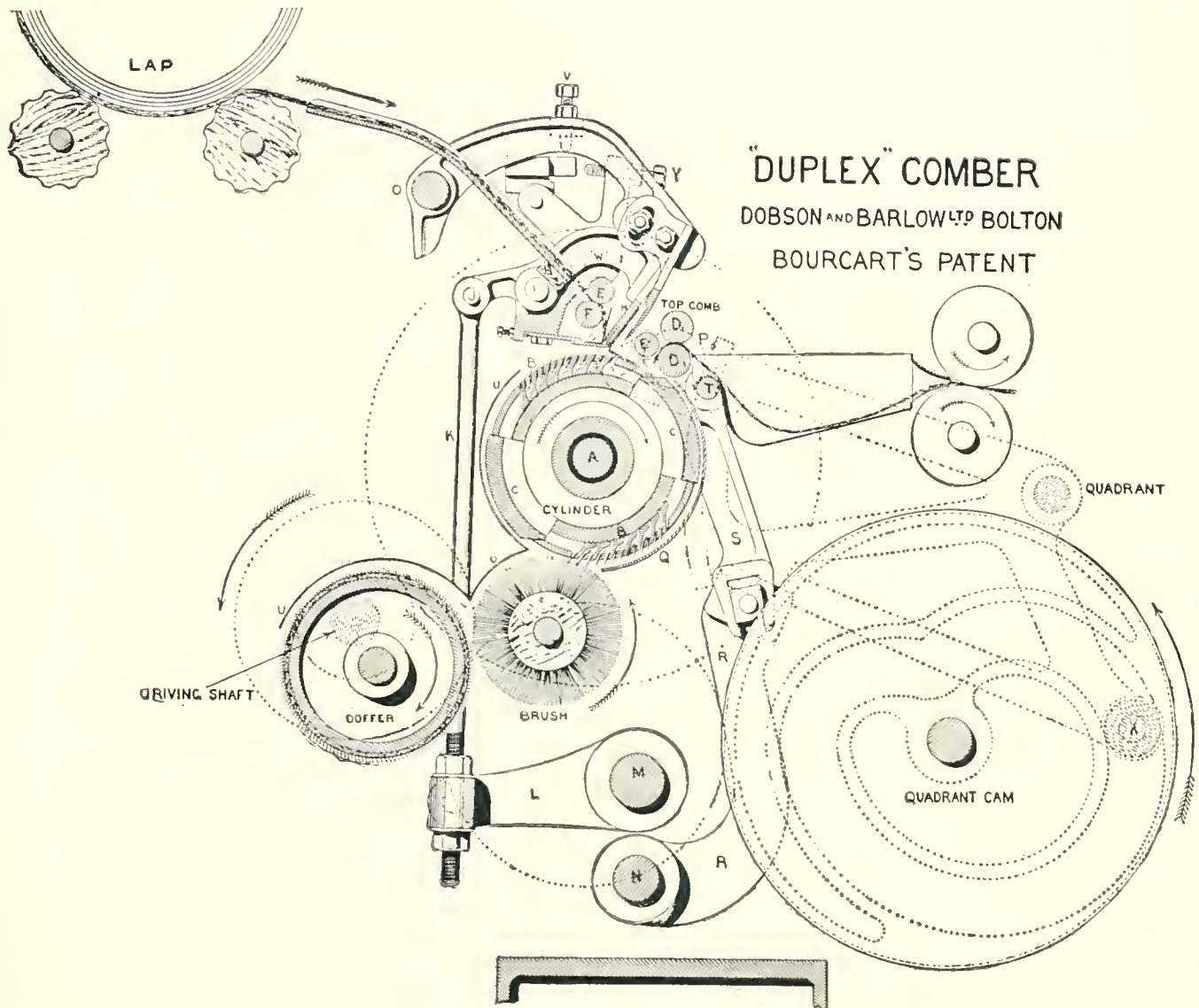


These Machines are made with either six or eight heads, and to work laps from $7\frac{1}{2}$ in. to $10\frac{1}{2}$ in. wide.

Different classes of cotton from $\frac{3}{4}$ in. staple to silk of $2\frac{1}{2}$ in. staple can be worked most successfully, without any changes being made except in the timing and setting of the machine.

The cylinder of this machine has two sets of combs and two fluted segments, which, with the necessary appliances for actuating the feed, nip, and detaching motions, enable the machine to be run at an increased speed, so as to give 120 nips per minute. This means that a production of 50% more can be got off this machine than from that of the ordinary type, and the same quality of work is maintained.

We give an illustration showing the principal parts which constitute the invention.



The gearing of the principal parts is shown, and it will be seen that a simple and direct driving is obtained.

The cylinder is built up around the shaft A in such a manner that extreme exactness is insured, and interchangeability of parts can be effected with the greatest ease.

The objectionable Notch Wheel, with all its connections, is also dispensed with; these are substituted by a quadrant and clutch gear, or a friction cone, which are far more simple, more positive, and less expensive to maintain.

Improved Shape of Comb-strips, flocking entirely prevented, perfect stripping of the same by the brush ensured; each comb strip and half lap can be changed independently with perfect accuracy.

Improved Brush Driving Arrangement to drive the brush at variable speeds as the bristles wear down; this arrangement prevents much loose fibre from flying about the room and getting mixed with that which has already been combed.

Improved Nipper Knife and Cushion Plate. The cushion of thick leather or other substance is placed in the knife instead of on the plate, dispensing with the expensive and inconvenient mode of frequently covering the plates with roller leather and cloth, and will last ten times as long. The plate when set is a fixture and never needs removing; this avoids all possibility of damaging the cylinder needles when taking the plates off to be recovered, as in other makers' Machines; they are also much more durable.

The Cams which work the nippers and detaching roller lifters are placed in the middle of the Machine to dispense with all torsion. Improved and simplified mode of working the lifters, ensuring more accurate and easy setting.

With or without motion to stop the Machine after any required length has been put into the cans.

Improved Waste Shaft and Tins to collect the waste in lap form.

Patent arrangement for weighting leather roller with levers and springs dispensing with weights, &c.

The Machine is highly finished and is almost noiseless. It is remarkable for simplicity, easy working, and the small amount of power required to drive it.

SPACE OCCUPIED:—

	7 $\frac{1}{2}$ in. and 8 $\frac{1}{2}$ in. Laps.	9 in. Laps.	10 $\frac{1}{2}$ in. Laps.	Width.
8 Heads	15' 5" long	15' 9" long	16' 9" long	3' 4"
6 „	12' 7" „	12' 10" „	13' 7" „	3' 4"

PRODUCTION OF COMBER, per head, in 10 hours.

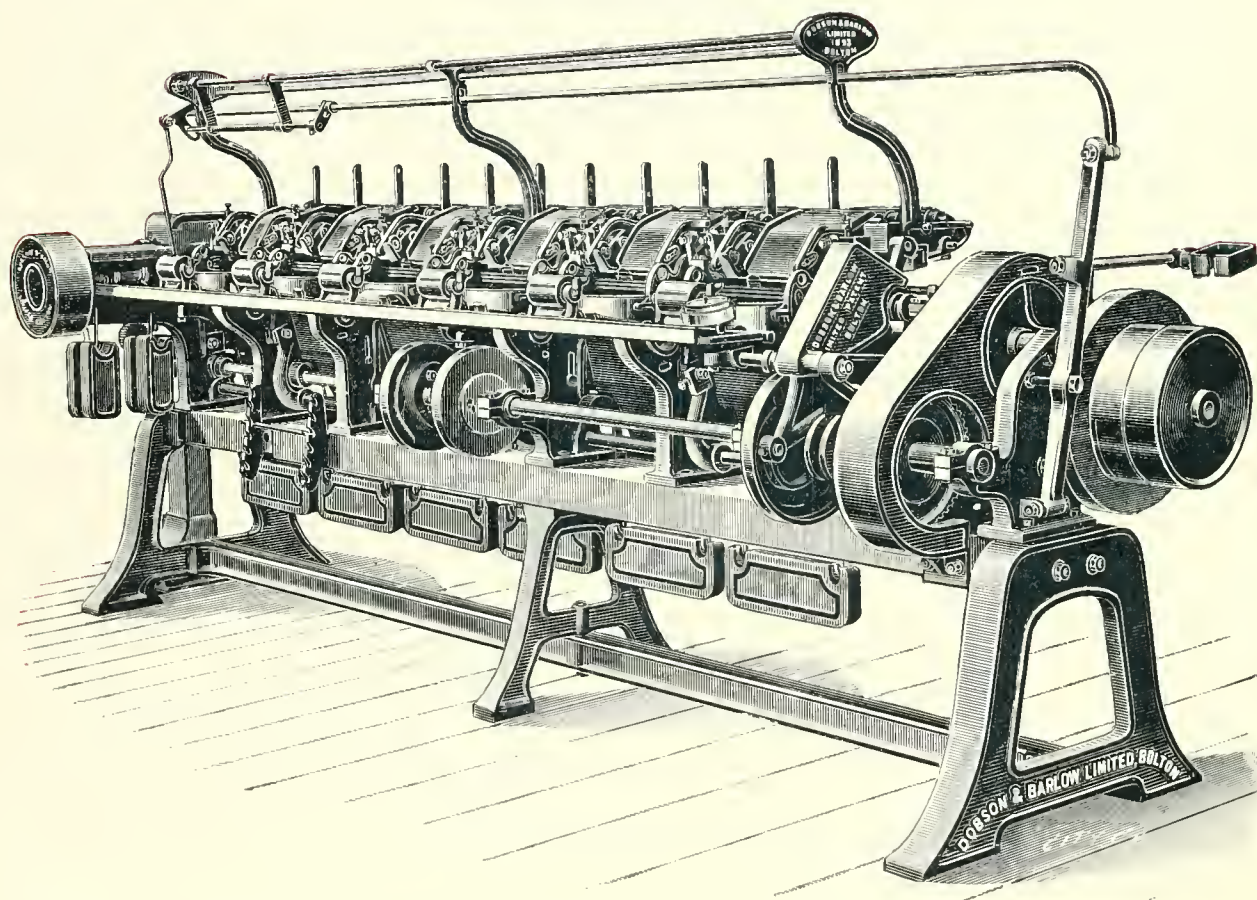
No. of Nips per Minute.	Weight of Lap per yard.	Width of Lap.	Waste.	Lbs. per Head of Combed Sliver.	Kind of Cotton Worked.
120	8 dwts.	7 $\frac{1}{2}$ "	20%	9 · 23	Sea Islands.
120	9 „	8 $\frac{1}{2}$ "	20%	10 · 47	do.
120	11 „	10 $\frac{1}{2}$ "	20%	12 · 93	do.
120	9 „	7 $\frac{1}{2}$ "	18%	10 · 88	Egyptian.
120	10 $\frac{1}{2}$ „	8 $\frac{1}{2}$ "	18%	13 · 04	do.
120	13 „	10 $\frac{1}{2}$ "	18%	16 · 12	do.
120	9 „	7 $\frac{1}{2}$ "	18%	10 · 88	American.
120	10 $\frac{1}{2}$ „	8 $\frac{1}{2}$ "	18%	13 · 04	do.
120	13 „	10 $\frac{1}{2}$ "	18%	16 · 12	do.

The above Productions are based upon a speed of 120 nips per minute, and for good qualities of work produced. We have Combers working heavier laps than specified above for medium qualities of work—this means the production will be greater than given above.

COMBING MACHINE

ON HEILMANN'S PRINCIPLE

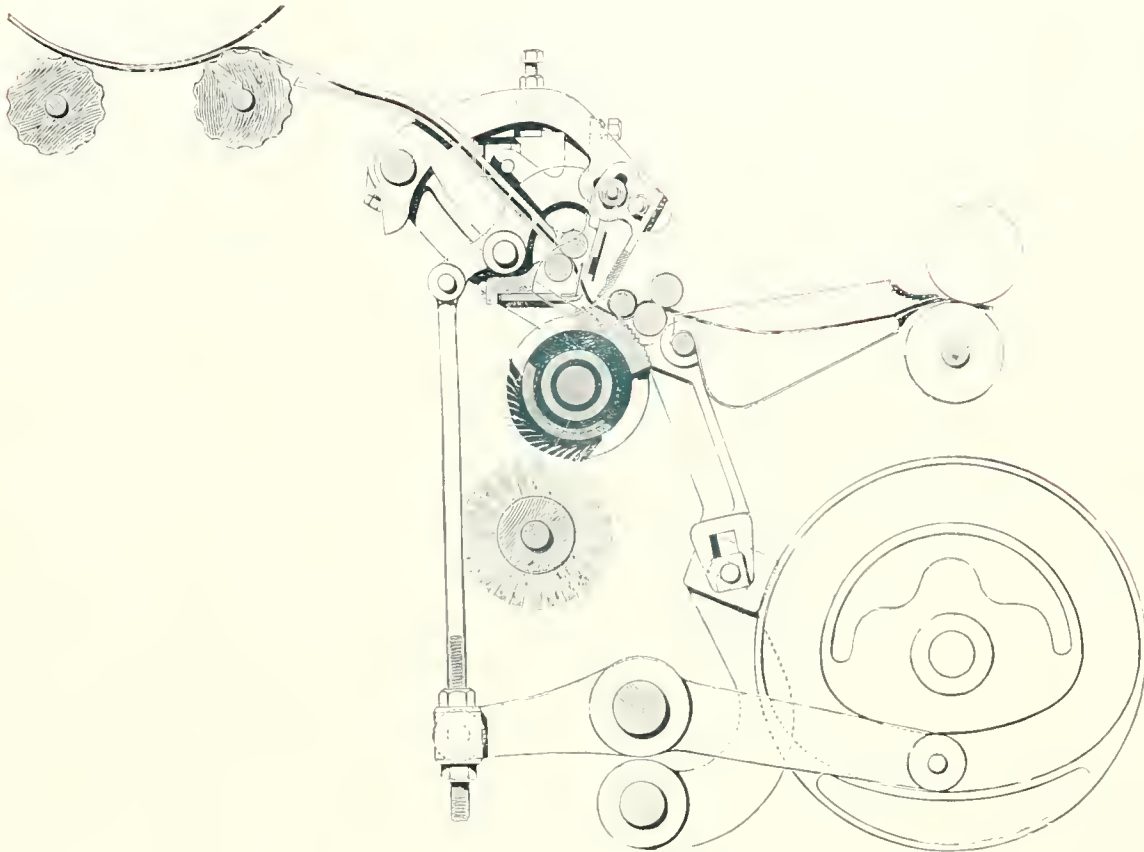
WITH OUR PATENTED AND SIMPLIFIED IMPROVEMENTS.



These Machines are made with either six or eight heads, and to work laps from $7\frac{1}{2}$ in. to $10\frac{1}{2}$ in. wide. The headstock has been entirely remodelled. The highest speeds are attained, the greatest solidity is given to the Machine, all vibration is dispensed with, and less floor space is required.

Different classes of cotton from $\frac{3}{4}$ in. staple to silk of $2\frac{1}{2}$ in. staple can be worked most successfully, without any changes being made except in the timing and setting of the machine.

The following illustration is a section of the Machine and shows our improved Nipper and mode of working same.



The objectionable Notch Wheel, with all its connections, is also dispensed with ; these are substituted by a quadrant and clutch gear, or a friction cone, which are far more simple, more positive, and less expensive to maintain.

Improved Cylinders, built on round stocks, are always a true circle, and perfectly concentric to the cylinder shaft. No possible inaccuracy can take place when changing half laps.

Improved Shape of Comb-strips, flocking entirely prevented, perfect stripping of the same by the brush ensured ; each comb strip and half lap can be changed independently with perfect accuracy.

Improved Brush Driving Arrangement to drive the brush at variable speeds as the bristles wear down; this arrangement prevents much loose fibre from flying about the room and getting mixed with that which has already been combed.

Improved Nipper Knife and Cushion Plate. The cushion of thick leather or other substance is placed in the knife instead of on the plate, dispensing with the expensive and inconvenient mode of frequently covering the plates with roller leather and cloth, and will last six times as long. The plate when set is a fixture and never needs removing; this avoids all possibility of damaging the cylinder needles when taking the plates off to be recovered, as in other makers' Machines; they are also much more durable.

The Cams which work the nippers and detaching roller lifters are placed in the middle of the Machine to dispense with all torsion. Improved and simplified mode of working the lifters, ensuring more accurate and easy setting.

With or without motion to stop the Machine after any required length has been put into the cans.

Improved Waste Shaft and Tins to collect the waste in lap form.

Patent arrangement for weighting leather roller with levers and springs dispensing with weights, &c.

The Machine is highly finished and is almost noiseless. It is remarkable for simplicity, easy working, and the small amount of power required to drive it.

Weights :—6 heads, Gross 39 cwt., Net 32 cwt.

8 „ „ 48 „ „ 39 „

Cubic measurement :—6 heads, 142 feet; 8 heads, 165 feet.

SPACE OCCUPIED:—

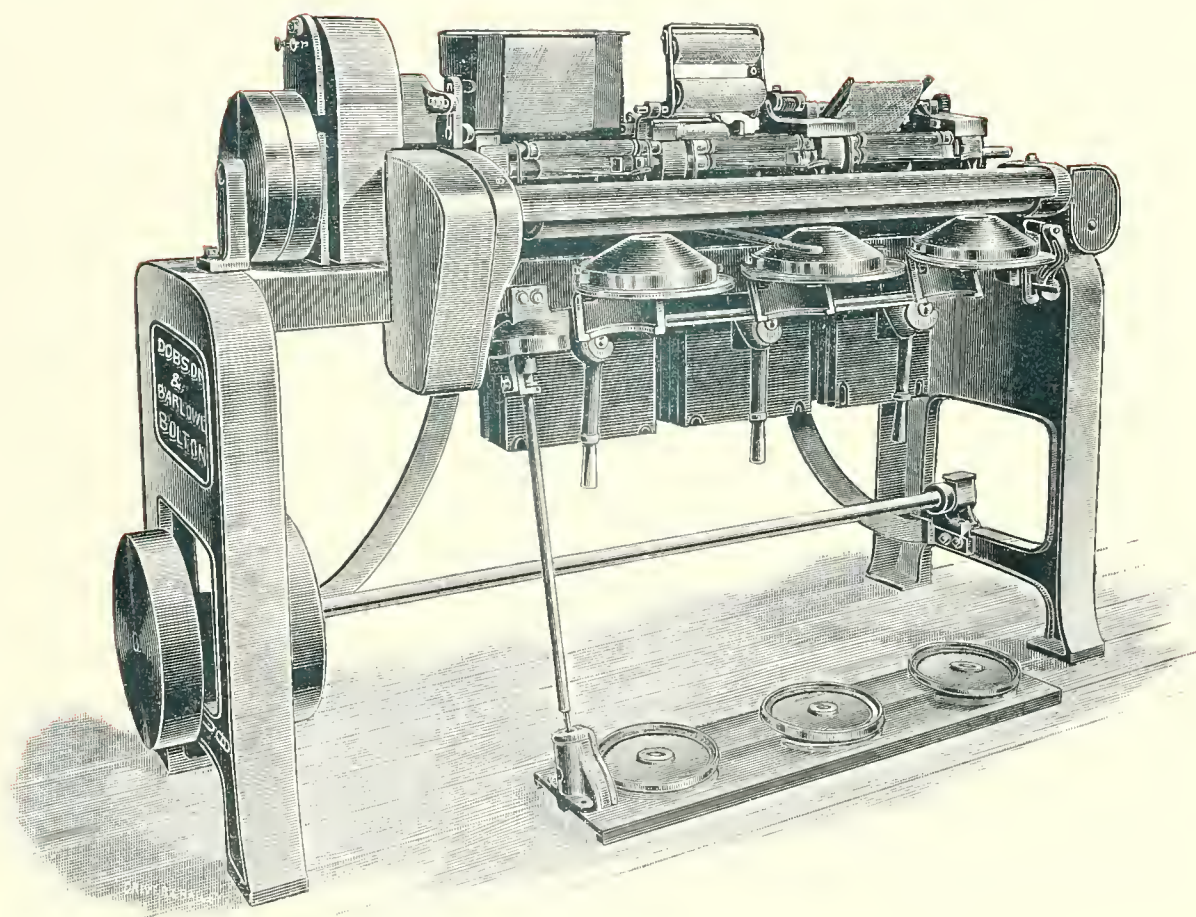
	7½ in. and 8½ in. Laps.	9 in. Laps.	10½ in. Laps.	Width.
8 Heads	15' 5" long	15' 9" long	16' 9" long	3' 4"
6 „	12' 7" „	12' 10" „	13' 7" „	3' 4"

PRODUCTION OF COMBER, per head, in 10 hours.

No. of Nips per Minute.	Weight of Lap per yard.	Width of Lap.	Waste.	Lbs. per Head of Combed Sliver.	Kind of Cotton Worked.
80	8 dwts.	7½"	20%	6 · 37	Sea Islands.
80	9 „	8½"	20%	7 · 22	do.
80	11 „	10½"	20%	8 · 92	do.
80	9 „	7½"	18%	7 · 5	Egyptian.
80	10½ „	8½"	18%	9 · 0	do.
80	13 „	10½"	18%	11 · 15	do.
80	9 „	7½"	18%	7 · 5	American.
80	10½ „	8½"	18%	9 · 0	do.
80	13 „	10½"	18%	11 · 15	do.

The above Productions are based upon a speed of 80 nips per minute, but we have machines running up to 95 nips per minute for Egyptian cotton.

IMPROVED DRAWING FRAME.



These Machines are made in number of deliveries and length of rollers according to requirements. Rollers 16 in., 17 in., and 18 in. long from centre to centre are the most usual.

No Electricity,

No Batteries,

No Dynamos,

No False Draughts.

Improved Back Spoon Stop Motion to stop the Frame when the cans run empty or when a sliver breaks.

Improved Double Action Front Stop Motion to prevent roller laps, and to stop the Machine if the sliver is too heavy or too light. This motion is a preventive to lumps, flat waste, or uneven sliver passing into the cans.

Motion to Stop the Machine when the cans are full, or after any desired length has been run into them.

Weight Relieving Motion to take the weight off the rollers when the frame is stopped, thus preventing flat places being made on the leather covered rollers.

Improved Back Roller Motion to prevent single, which is a feature possessed by no other frame and renders singles an impossibility.

Cut Teeth Draft Wheels.

The Roller Driving is arranged either at one end or at both as desired.

Simplest and Longest Range of Change.

All the Stand Bearings are made of phosphor bronze, and are extra wide.

All Gearings are covered so as to avoid accidents and prevent dirt from getting into them.

Cast Iron Flats for stationary or revolving cloth, or with patent top clearers. See pages 71 and 73.

Improved Middle and Back Traversing Motions.

Top Rollers with loose bushes—a great improvement upon top rollers with loose bosses both from point of oiling and friction.

Bottom Rollers case-hardened all over, or in the necks and squares only.

The strongest, simplest, and best finished frame made. The sliver produced is of a regularity and evenness that cannot be surpassed.

Bottom and Top Rollers of our own manufacture, recognised by the trade as the most perfect. Special fluting and other details for delicate and difficult cotton.

SPACE OCCUPIED.

Multiply the number of deliveries by the distance from centre to centre of roller stands, and add the following for:—

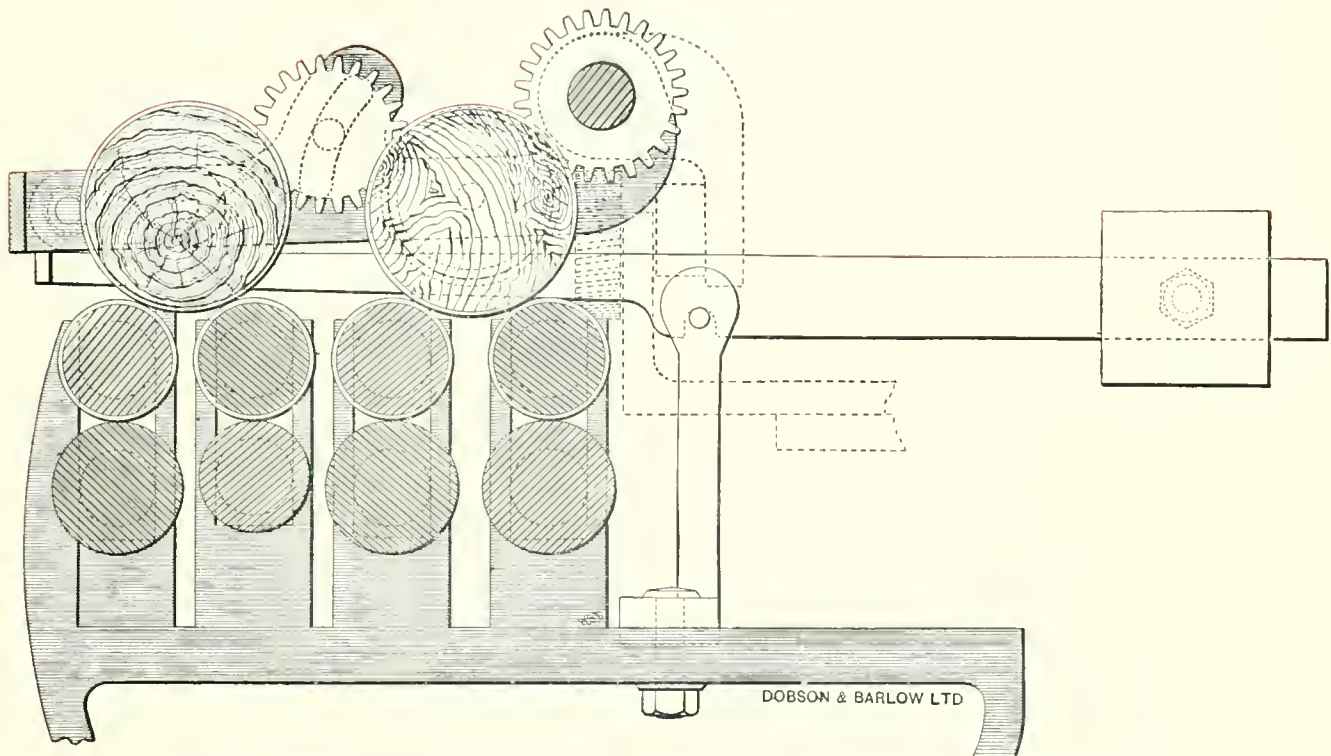
One head	....	....	3 ft. 0in.
Two „	....	....	5 „ 2 „
Three „	....	....	7 „ 4 „
Four „	....	....	9 „ 6 „

Width of Frames:—If deliveries all on one side, 4 ft. 6 in.
 „ „ in zigzag form, 5 feet.

WEIGHTS AND CUBIC MEASUREMENT.

	Without Weights.		Roller and other Weights if supplied.		Cubic Measurement.	
	Gross Cwts.	Net Cwts.	Gross Cwts.	Net Cwts.	Without Weights.	Weights only.
3 heads of 3 deliveries each....	54	38	14	13	193	11
3 „ 4 „ „	68½	52½	17½	16½	230	12
3 „ 5 „ „	80	62	22½	21	266	14
3 „ 6 „ „	88	70	27	25½	297	17
3 „ 7 „ „	98	76	31	30	339	20

PATENT REVOLVING TOP CLEARER.



PATENT REVOLVING CLEARER MOTION

This Patent Revolving Clearer Motion has been introduced to dispense with the too frequent cleaning and the evils that exist through the accumulation of waste, which are inevitable in other forms of Clearer Motions. From the drawing it will be seen to consist of a loose wooden roller covered with flannel resting and driven by friction between the third and fourth rollers, and another covered wooden roller resting between the first and second rollers; this last roller is driven positively at a slightly different speed than the leather roller in order to obtain the necessary friction with the result that instead of waste accumulating it is gathered up with the revolving roller and taken round in the form of a lap. The cleaning of this roller once a week is a great improvement upon the flat form of clearer which requires attention every two or three hours.

The pressure of the clearer upon the leather rollers is a very important factor and its adjustment is obtained by means of a weighted lever as shown in the sketch. Further the motion is so arranged that a longitudinal traverse is given to the clearer rollers, the effect of which is to thoroughly clean the leather extending a little on either side beyond where the slivers pass and thus gives them a clean passage through the machine.

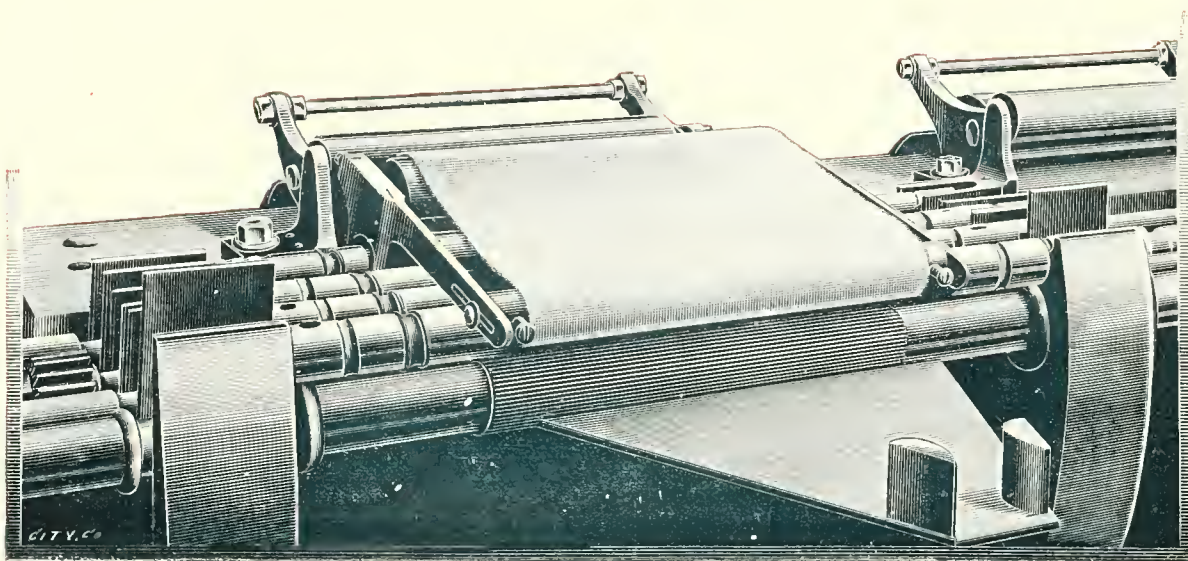


FIG. 1.

WORKING POSITION OF PATENT CLEARER.

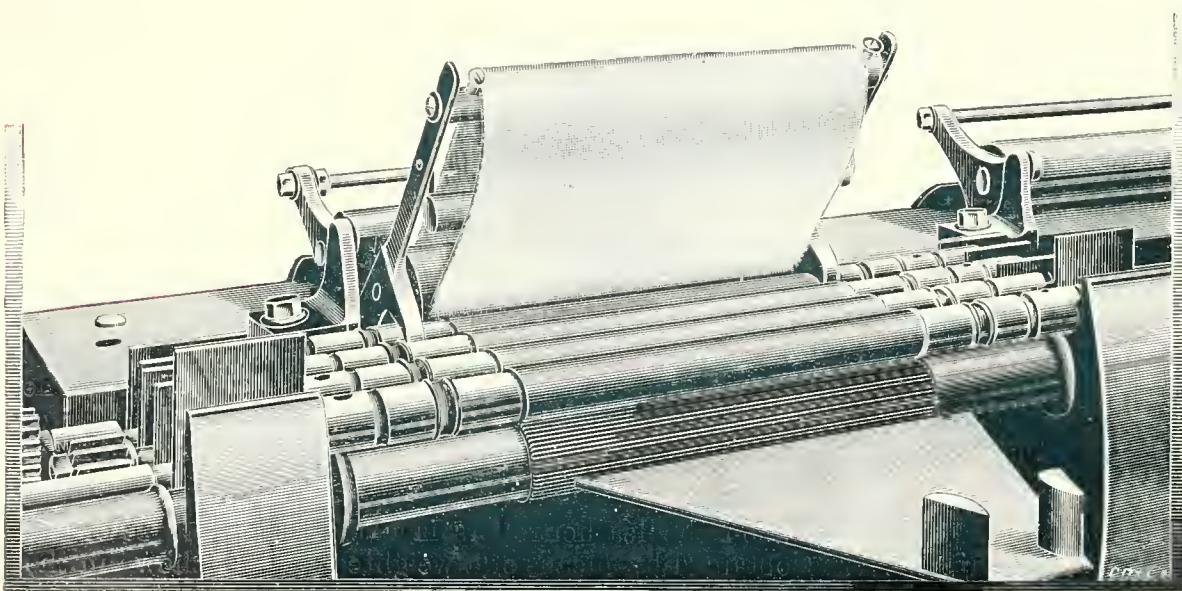


FIG. 2.

PATENT CLEARER PUT OUT OF WORK.

DOBSON & VARLEY'S NEW PATENT TOP CLEARER FOR PREPARING FRAMES.

Notwithstanding the many kinds of Top Clearers on the market at the present time the need for still further improvements is apparent. It is to meet this want that the **Dobson-Varley Top Clearer** has been devised.

Briefly stated, the patentees claim that while being of finished and durable workmanship and thoroughly effective, the **cost of making** is lessened and the Top Clearer can therefore be supplied at a reduced figure as compared with others.

Simple in construction and arrangement, and without any of the complications so often seen, it can be **easily applied and kept in working order**.

It is not dependent for its success upon the constant attention of the frame tender but **works smoothly and constantly**, and with the **highest attainable results**.

By the use of this Top Clearer, the **leather rollers keep their polished surface** considerably longer than under other conditions.

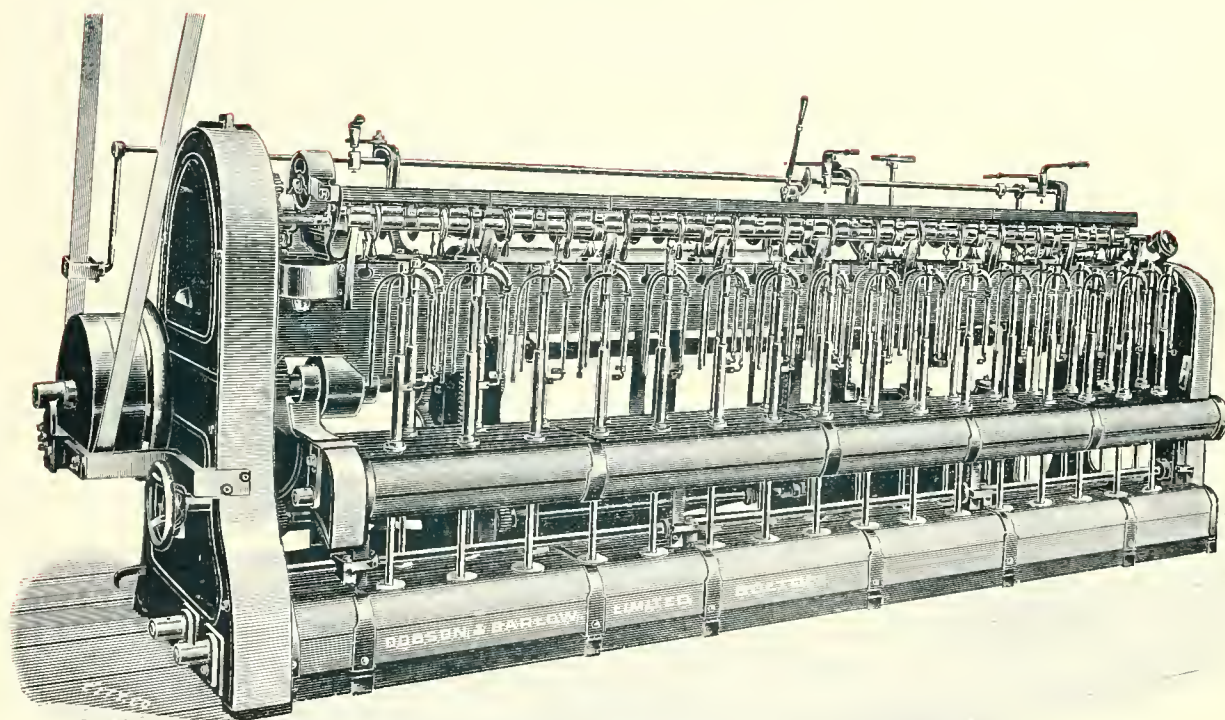
Further, the waste accumulates upon the revolving cloth in the form of a fleece **avoiding all risk** of it getting into the sliver. As a consequence, there is, of course, **cleaner and greatly improved yarn**. There is, too, a **freedom from roller laps** and a **marked saving** in roller leather through less frequent varnishing.

This Clearer when not at work can be thrown back as shown in Fig. 2.

The following information should be given when ordering these clearers :—

1. Length of boss on fluted part of bottom roller.
2. Diameter of spaces on each side of top roller boss.
3. Distance of roller centres from front to back.
4. Number of deliveries in each head.
5. Number of heads.

IMPROVED SLUBBING, INTERMEDIATE, ROVING, AND JACK FRAMES.

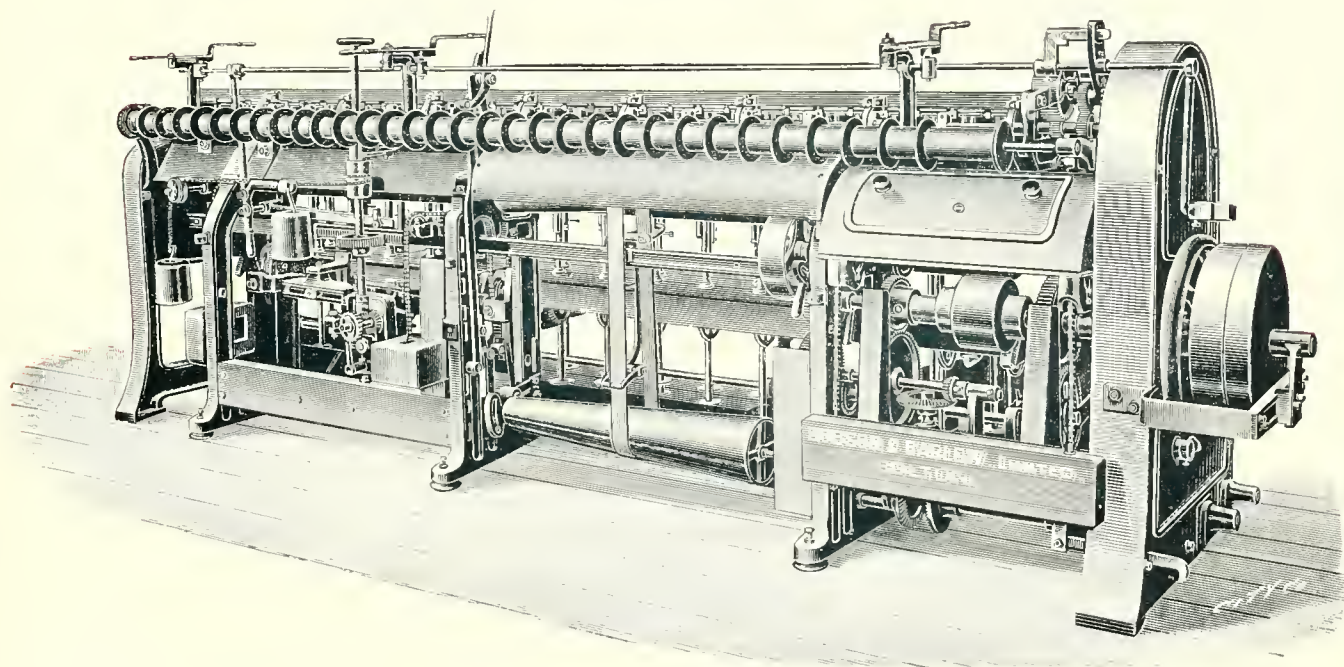


These Machines have an exceptional reputation as being the lightest running Frames in the trade. They are made from the most approved patterns which are strong, well proportioned, and of neat design. The workmanship throughout is of the very highest class; the different parts are made to templates and all jointings are milled or planed; the utmost freeness in working is thus ensured and the highest possible speeds attained with a minimum of driving power and expenses of wear and tear.

We apply either our ordinary Differential Motion or our Patent Differential Motion as described on page 81.

Improved Swing which contains the carrier driving the bobbin shafts; this is particularly well stayed by two strong arms, permitting the spindles to run at any speed without vibration.

Improved Tapering Motion, easy to change, never out of order, perfect taper in the bobbins.



Extra Low Framing, giving the greatest facilities for creeling.

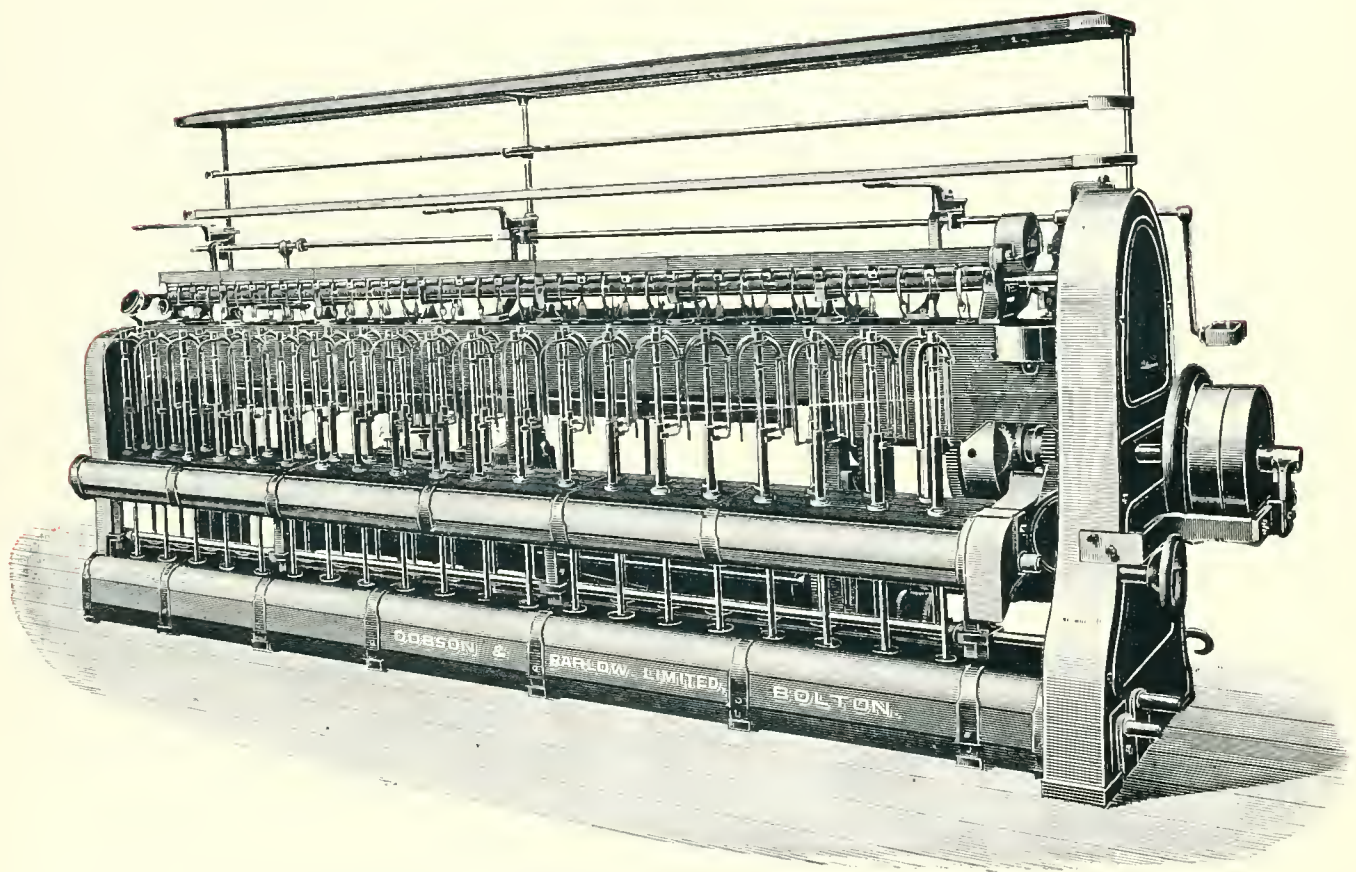
Simplest and easiest method for Raising or Lowering Bottom Cone Drum, with an arrangement for tightening Cone Strap, which is extra long, thereby dispensing with the frequent relacing of the same.

Simple and improved plan of Winding Back the Cone Drum Strap from the front or back of Frame.

All Roller Stands are bushed with brass.

All Wheels run on cast iron studs with best oiling arrangements.

All Shafts are extra strong to prevent torsion or springing, and all bearings are well polished.



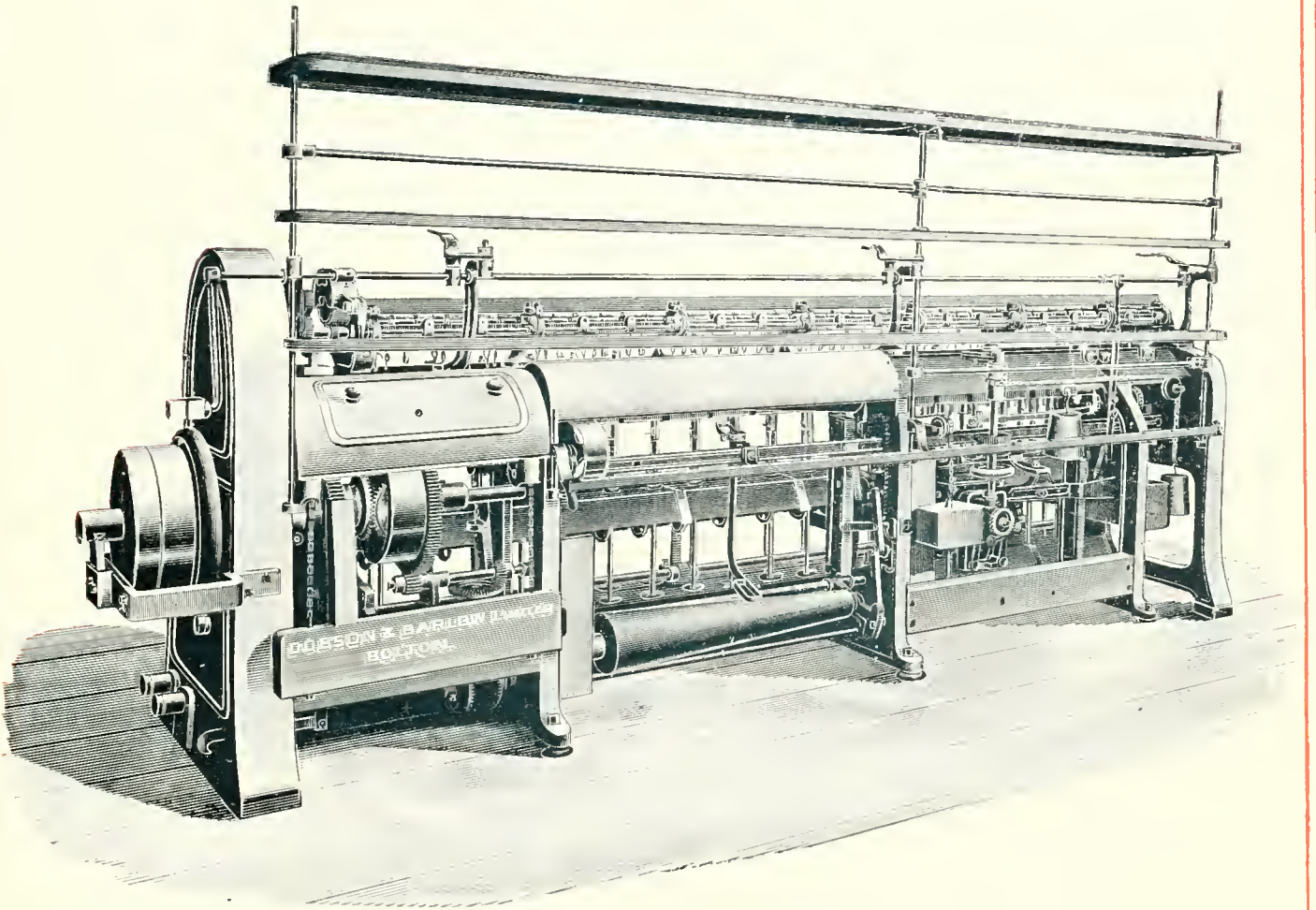
Most simple and efficient changing or reversing motion with ordinary star or ratchet wheel, or with Patent Rack Escape Motion as described on page 85.

All Top Rails are truly balanced and work freely in their slides.

Positive Knocking-off Motion to knock-off when bobbins are full, or

Improved Knocking-off Motion driven from front roller to knock-off when any desired length has been put on to the bobbins. Any length can be put on to the bobbins by simply changing the wheel that works into the front roller.

Disengaging Motion to Bobbin and Lifter Shafts (for Stubbers and Intermediates only).



Angle Iron Creels lined with wood, with pot footsteps.

The Spindle Footsteps are usually made with a recess and brass bottom, or on the self-lubricating principle with loose brass bottom. We also make them as per Patent Arrangement as described on page 87.

Steel Fliers of our own make, all made from fine steel specially chosen.

These Frames run with the least driving power, and in consequence of the superior finish of the Spindles, Fliers, Rollers, &c., make an absolutely even sliver from beginning to end of the largest diameter of bobbin of any numbers or counts. The frames stop a less number of times to piece up broken ends, and they necessarily produce more than any other frames made.

Bottom and Top Rollers of our own manufacture, recognised by the trade as the most perfect; special fluting and other details for delicate and difficult cotton.

The particulars of the different Frames are generally as follows, it being understood that they can be made with any number of spindles according to requirements or space at disposal:—

Slubbing Frames:—Dia. of the Spindles $1\frac{3}{8}$ in. or $\frac{7}{8}$ in.; lift of the Bobbins, 10 in., 11 in., or 12 in.; three lines of Rollers single boss, Single Centrifugal Presser Fliers, Short Collars, Recessed Footsteps with brass bottoms, polished cast iron Turn Over Clearer Flats for stationary cloth, and Indicator.

	in.	in.	in.	in.	in.	in.	in.
Distance of spindles from centre to centre....	8	$8\frac{1}{2}$	9	$9\frac{1}{4}$	$9\frac{1}{2}$	10 or $10\frac{1}{4}$	
Or equal to 4 spindles in ....	....	16	17	18	$18\frac{1}{2}$	19	20 ,, $20\frac{1}{2}$
Diameter of bobbin when full ....	....	$5\frac{1}{2}$	$5\frac{3}{4}$	$5\frac{3}{4}$	$5\frac{3}{4}$	$5\frac{3}{4}$	$5\frac{3}{4}$,, $5\frac{3}{4}$

Intermediate Frames:—Dia. of the Spindles, $\frac{3}{4}$ in. or $1\frac{3}{8}$ in.; lift of the Bobbins, 9 in., 10 in., or 11 in.; three lines of Rollers single boss, Single Centrifugal Presser Fliers, Short Collars, Recessed Footsteps with brass bottoms, polished cast iron Turn Over Clearer Flats for stationary cloth, and Indicator.

	in.	in.	in.	in.	in.	in.
Distance of spindles from centre to centre	$5\frac{1}{2}$	$5\frac{3}{4}$	6	$6\frac{1}{4}$	$6\frac{1}{2}$ or 7	
Or equal to 6 spindles in ....	....	$16\frac{1}{2}$	$17\frac{1}{4}$	18	$18\frac{3}{4}$	$19\frac{1}{2}$,, 21
Dia. of bobbin when full ....	....	$3\frac{7}{8}$	4	$4\frac{1}{4}$	$4\frac{3}{8}$	$4\frac{1}{2}$,, 5

Roving Frames :—Dia. of the Spindles $\frac{5}{8}$ in. or $\frac{11}{16}$ in.; lift of the Bobbins, 7 in. or 8 in.; three lines of Rollers double boss, Single Centrifugal Presser Fliers, Short Collars, Recessed Footsteps with brass bottoms, polished cast iron Turn Over Clearer Flats for stationary cloth, and Indicator.

		in.	in.	in.	in.	in.
Distance of spindles from centre to centre....	....	$4\frac{3}{4}$	5	$5\frac{1}{8}$	$5\frac{1}{4}$ or	$5\frac{1}{2}$
Or equal to 8 spindles in ....	....	19	20	$20\frac{1}{2}$	21	22
Dia. of bobbin when full ....	....	$3\frac{1}{4}$	$3\frac{1}{2}$	$3\frac{1}{2}$	$3\frac{5}{8}$	$3\frac{7}{8}$

Jack Frames :—Dia. of the Spindles, $\frac{9}{16}$ in., $\frac{5}{8}$ in., or $\frac{11}{16}$ in.; lift of the Bobbins, 5 in., 6 in., or 7 in.; three lines of Rollers double boss, Single Centrifugal Presser or Soft Bobbin Fliers, Short Collars, Recessed Footsteps with brass bottoms, polished cast iron Turn Over Clearer Flats for stationary cloth, and Indicator.

		in.	in.	in.	in.	in.	in.
Distance of spindles from centre to centre....	....	$3\frac{1}{2}$	$3\frac{3}{4}$	4	$4\frac{1}{4}$	$4\frac{3}{8}$ or	$4\frac{1}{2}$
Or equal to 8 spindles in....	....	14	15	16	17	$17\frac{1}{2}$	18
Or with single boss rollers to 10 spindles in		$17\frac{1}{2}$	$18\frac{3}{4}$	20	$21\frac{1}{4}$	$21\frac{7}{8}$	$22\frac{1}{2}$
Dia. of bobbin when full ....	....	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	$2\frac{7}{8}$	3

If required we can apply the following :—

- Loose Boss Top Rollers to front line.
- Single Boss Rollers to the Roving and Jack Frames.
- Long Collars.
- Bobbin Boxes.
- Polished Steel Dividing Plates.
- Double Pressers to the Fliers.
- Bottom Rollers case-hardened all over, or in the necks and squares only.
- Round Clearers with traverse motion and heavy self-weighted Back Top Rollers in place of cast-iron flats and ordinary Rollers.

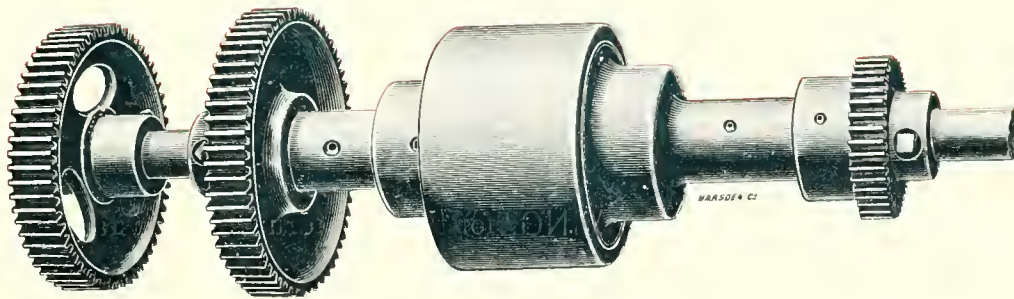
SPACE OCCUPIED.

Multiply half the number of Spindles in the Machine by the space of the Spindles, and add 2ft. 9in. for Gearing, etc., for Single-driven Frames, and 4ft. 7in. for Frames driven at each end: if with outside support to driving shaft, add 3 in. for Single-driven Frames and 6 in. for Double-driven Frames. Width of Frames:—Slubbing, 5 ft. including cans; Intermediate, Roving, and Jack Frames, 3 ft.

WEIGHTS AND CUBIC MEASUREMENTS.

No. of Spindles.	Lift.	Space.	Without Weights.		Roller & other Weights if Supplied.		CUBIC MEASUREMENT.	
			GROSS CWTS.	NET CWTS.	GROSS CWTS.	NET CWTS.	Without Weights. FEET.	Weights only. FEET.
SLUBBING FRAMES.								
60	10	8	69½	49	18½	16¾	274	14
72	10	8	76¾	55½	20¼	18½	311	13
90	10	8	94	70	19	17½	363	14
80	10	9	93¼	69	23¼	21¾	351	15
92	10	9	96¼	70	27¼	25¾	402	18
76	10	10	82½	62	23¼	21½	386	15
86	10	10	96¾	69½	25	23	402	17
INTERMEDIATE FRAMES.								
136	9	6	106½	80	23	21¼	397	16
100	9	6½	88	63	23½	22	340	15
116	9	6½	95½	70½	26½	24	367	19
136	9	6½	106½	78¼	32	29¼	408	22
94	10	6½	85	61¾	20¾	19	324	14
120	10	6½	101	73¾	28	25¾	363	18
ROVING FRAMES.								
114	7	5	77½	56½	12	10¾	286	9
120	7	5	79	57¾	19	17½	296	13
144	7	5	86	65½	21½	19½	312	14
144	7	5⅛	90½	66¼	21½	20	333	14
160	8	5⅛	98¼	71	24¼	22½	359	15
144	7	5¼	89	65½	21¾	20	326	14
164	7	5¼	99¼	72¾	24¼	22½	360	14
160	8	5¼	103	74¾	15	13½	361	12
JACK FRAMES.								
200	5	4	98¾	75¾	15½	14½	314	12
200	6	4	97½	77¼	24	22¼	310	16
134	6	4¼	79¾	59½	12¼	11	317	9
192	6	4¼	97	74	15¾	14¾	312	12
200	7	4¼	103¾	79¼	16½	14¾	359	14

IMPROVED PATENT DIFFERENTIAL MOTION.



ADVANTAGES.

COMPACTNESS.—The whole motion is so compact that in outward appearance it somewhat resembles in size and shape an ordinary shaft box-coupling.

LUBRICATION.—The motion is arranged so that there is a permanent system of lubrication. The oil enters at T directly on to the driving shaft, a recess in the boss of the spherical bearer allows the oil to flow into an enlarged chamber R, from this chamber through the oilhole U it lubricates the spherical bearing and the bevel wheel C. The oil also finds its way to the bearing surface of C and E, and to the teeth of

the wheels. It is prevented from escaping by the casing O which catches the oil when the frame is at rest, but immediately it is re-started the oil is again distributed over the motion by means of the projections N : the motion is thus practically found to be continually covered with oil, and as a consequence the FRICTION is reduced to a minimum.

CLEANLINESS.—The casing O and the cam E effectually cover in the whole of the motion, so that it is thoroughly protected from dirt or loose cotton.

FRICTION.—The lubrication of the motion reduces the friction considerably, but a greater gain is obtained in the reduction of friction by the whole motion revolving in one direction only, that is, the same way as the driving shaft ; this relieves the cone drum strap of a great strain which in the older motion is a serious defect. The result of this gain is that *LESS BELTING* is required.

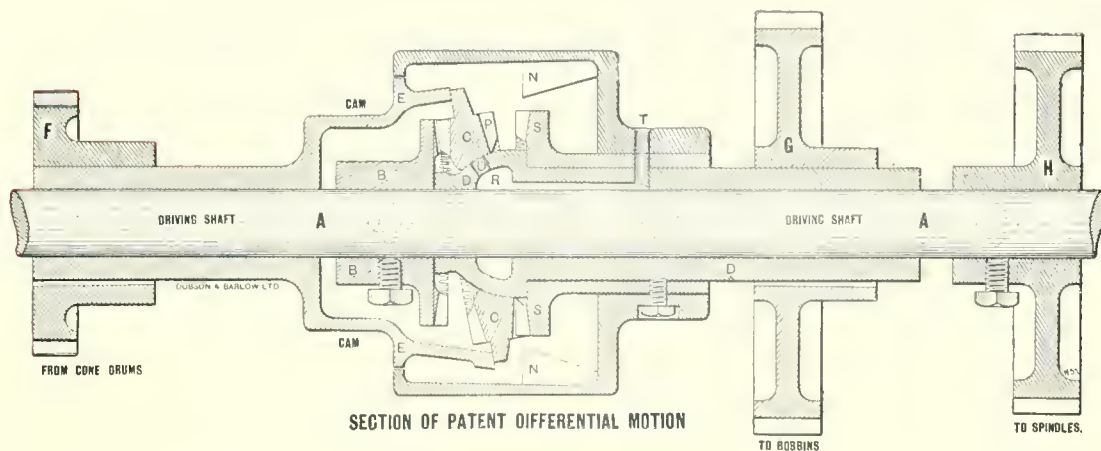
LESS OILING, POSITIVE DRIVING, for the cone drums act instantaneously and so there is no stretched roving and broken ends which mean with the older motion waste and loss of time.

LESS POWER TO DRIVE —This gain is also effected because there is far less *GEARING*, the motion containing only two active wheels, and since these are so thoroughly protected by the outer casing O it is absolutely impossible for the most careless or inexperienced workhand to be caught or injured.

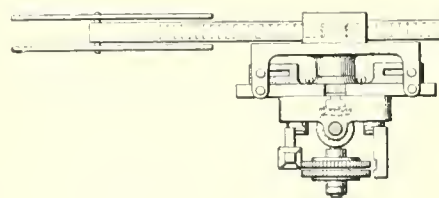
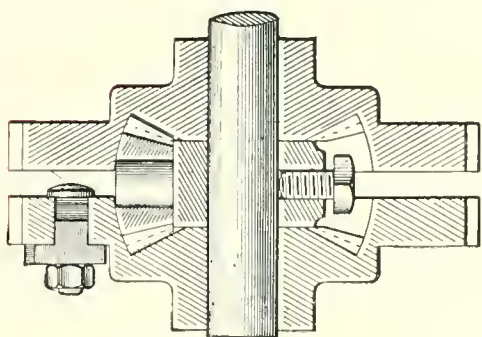
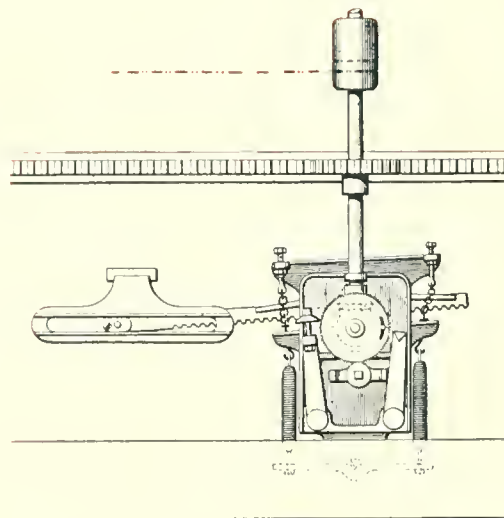
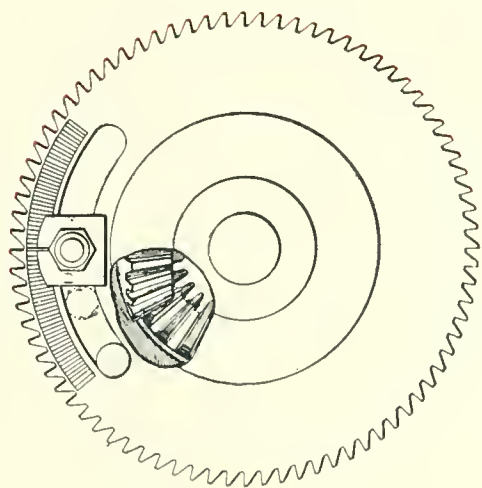
DESCRIPTION.

Upon the driving shaft A is a fixed bevel B ; gearing into this bevel is a larger one C, mounted upon a spherical bearing D, by means of teeth on the back of the bevel C gearing into the toothed wheel S which is fixed to the spherical bearing ; on the boss of the spherical bearing is keyed the

bobbin wheel G, through which the bobbins are driven. If B is now driven C will revolve at the same speed as B for they are at this moment practically clutch wheels, at the same time the cam E driven from the bottom cone drum through the jack shaft and wheel F, is arranged to run at a speed equal to the bevel C; it is thus seen that the bevels B and C, the cam E, the bobbin wheel G, and the spindle wheel H are all running in the same direction and at the same speed; under these conditions the



bobbin will run the correct speed for winding on, that is quicker than the spindles. Now this quicker speed must be slowly reduced as the layers of roving are added on to the bobbin; to effect this the strap is moved towards the large end of the bottom cone drum—this slows the cam E, and since the cam E regulates the gearing point of the bevels B and C, it follows that directly we alter the speed of the cam we move the gearing point, and so when the cam slows this point moves backwards in the opposite direction to the driving shaft; the rolling motion thus produced (and permitted by the spherical bearing), reduces the speed of C, and this reduction transferred to the bobbin wheel G slows the speed of the bobbin.



PATENT DIFFERENTIAL RACK ESCAPE MOTION.

PATENT

DIFFERENTIAL RACK ESCAPE MOTION

FOR FLY FRAMES (SLUBBERS, INTERMEDIATES, ROVERS AND JACKS).

This motion has been designed to avoid the use of change ratchet wheels for the building motion used in Fly Frames, and by its means a finer adjustment of the lift is obtained.

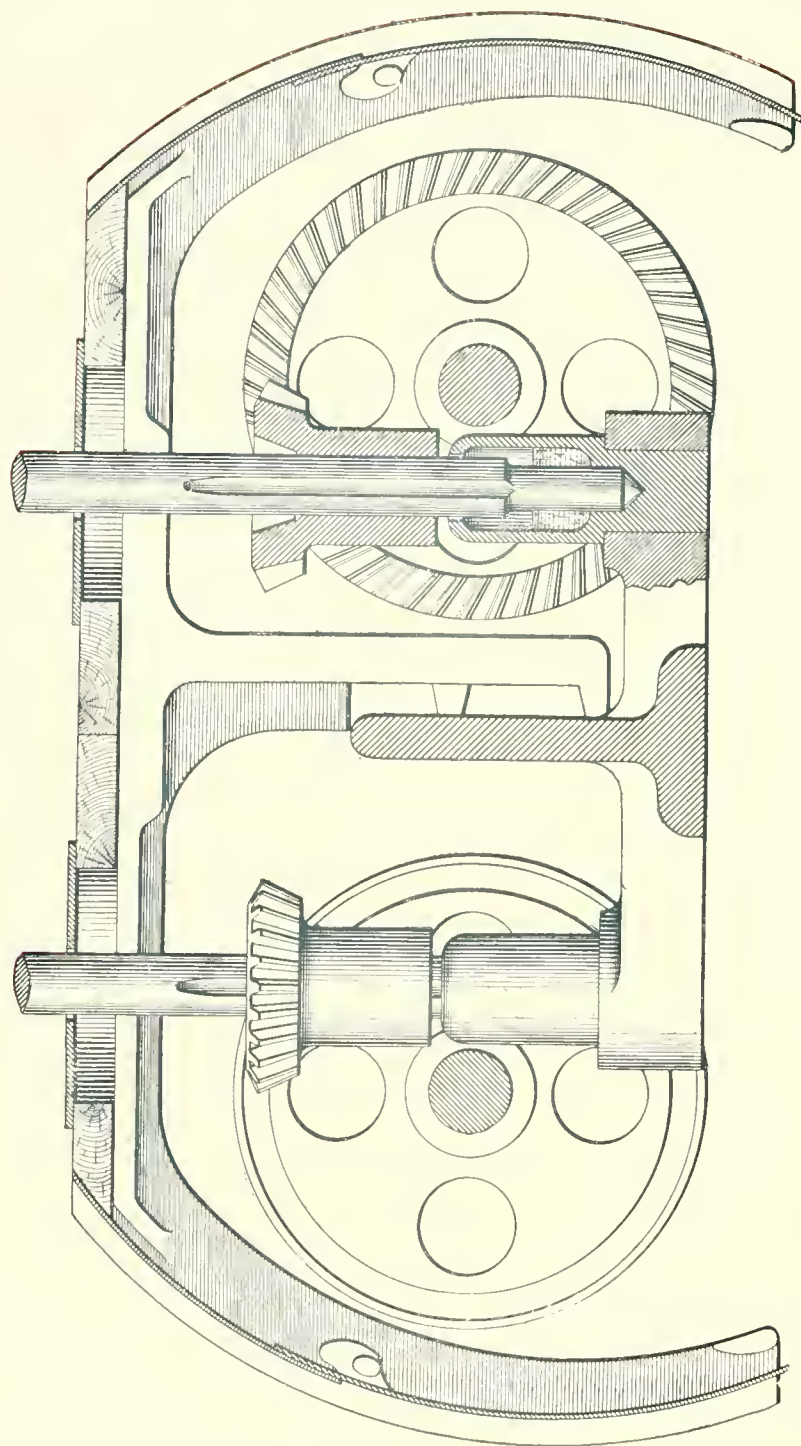
The motion consists of a pair of special ratchet wheels, mounted loosely upon a shaft geared to the upright shaft which carries the pinion in gear with the rack connected to the strap fork of the cone drum strap.

The pair of ratchet wheels, which are of equal diameter, have ratchet teeth cut round their periphery, and inside each wheel is an annular ring of bevel teeth; lying between and gearing into both of the internal wheels is a bevel pinion carried in a bracket secured to the shaft geared to the upright shaft. A concentric slot, fitted with an adjustable stop piece, is cut in the rim of one ratchet wheel, and a pin fitted in the other wheel projects into this slot. The teeth alongside the slot are stamped and numbered to enable the stop piece to be readily set.

The ratchet wheels are actuated by a suitably shaped pair of catch levers in the customary way, and their movement is transmitted by the pinion placed between the ratchet wheels to the upright shaft and so to the rack and strap fork which moves the strap on the cones.

The length of traverse of the pin in the slot is regulated by setting the stop piece and by this adjustment the extent of the traverse can be regulated very accurately and the necessary changes of the rack are made without the use of spare or extra ratchet wheels.

This Motion can be set to much finer changes than any motion at present in the market.



PATENT ARRANGEMENT FOR LUBRICATING SPINDLE FOOTSTEPS OF FLY FRAMES.

PATENT ARRANGEMENT FOR LUBRICATING SPINDLE FOOTSTEPS OF FLY FRAMES,

(SLUBBERS, INTERMEDIATES, ROVERS AND JACKS).

This improvement consists of an arrangement to lubricate in an efficient manner the footstep bearings of the spindles.

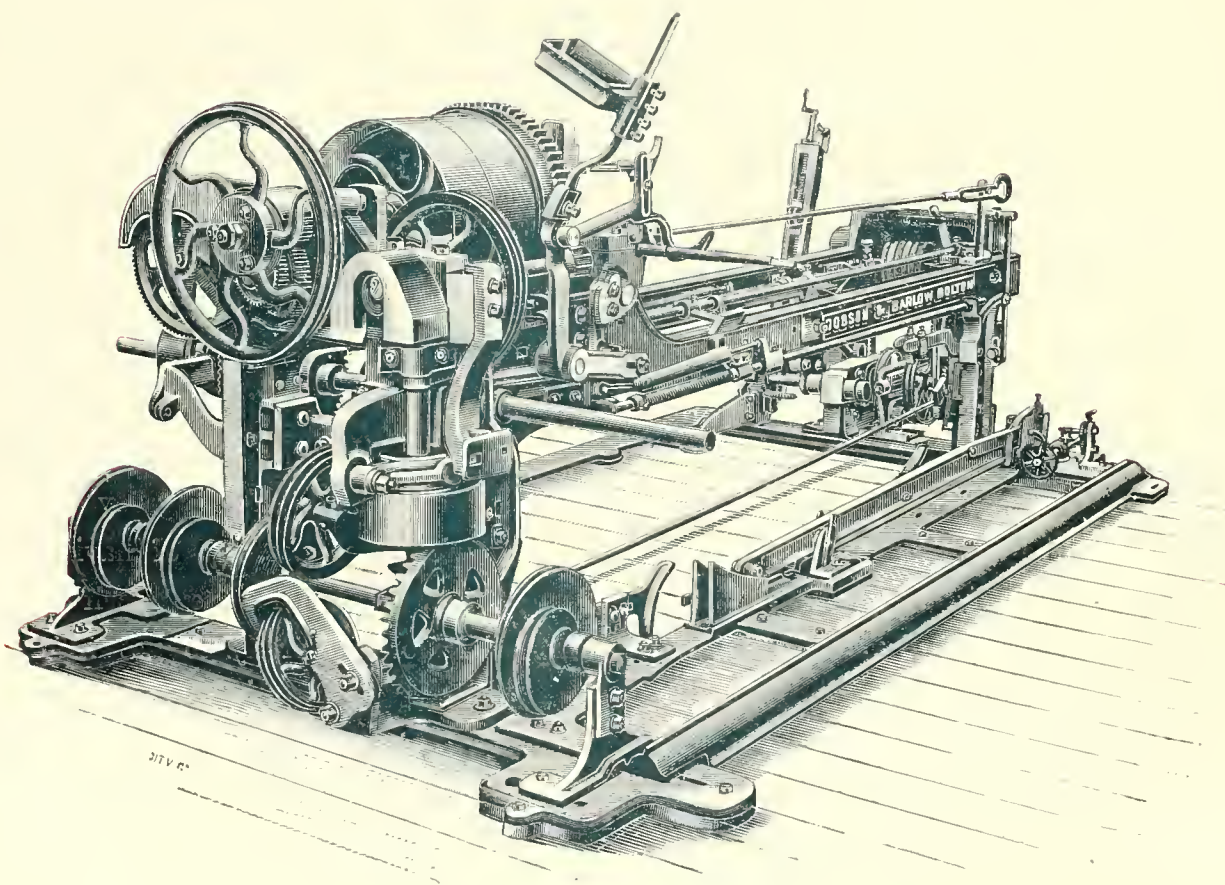
In order to do this we groove the spindle from that part where it is reduced in thickness to form the footstep, and extend the groove up the spindle to just above the top of the spindle wheel. We further make a recess or groove in the top of the spindle wheel so as to form an oil cup and the oil placed therein will naturally run down the groove to the footstep. This entirely does away with the necessity of having to lift the spindle out to oil the footstep. The footstep itself is entirely covered in so that it is impossible for dirt or fly to get into the oil.

The illustration we give will we are sure clearly show the arrangement mentioned.

IMPROVED PATENT SELF-ACTING MULE

MADE FROM OUR 1889 PATTERNS, SUITABLE FOR SPINNING
ANY COUNTS OF YARN.

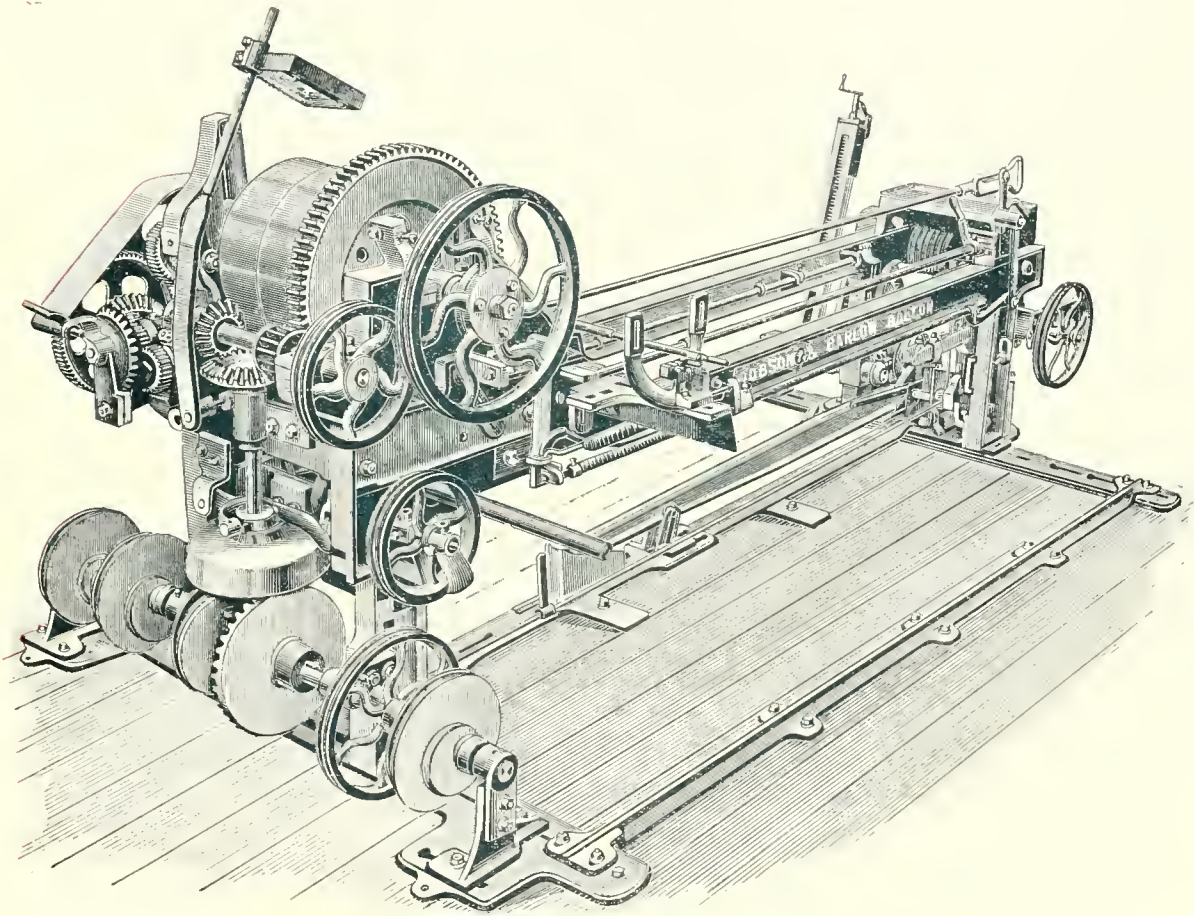
MADE FOR 56 in., 58 in., 60 in., 62 in. or 64 in. DRAW, ACCORDING
TO THE NUMBERS TO BE SPUN.



HEADSTOCK WITH RIM PULLEY AT BACK.

The claims made for this Mule are:—

Simplicity of construction, neatness in design combined with strong and well proportioned patterns; the different motions and change places are most easy of access; all jointings are planed or milled, and all parts are interchangeable, being planed, tongued, grooved, and finished to template by special tools.



HEADSTOCK WITH RIM PULLEY AT SIDE.

The principal borings are also done to template and at one operation by a special machine; this gives the greatest accuracy and facility in setting and erecting as the bearings or supports when once bored cannot get out of "truth." The utmost steadiness and freeness are thus obtained together with light and noiseless running, highest speeds and greatest production.

With these advantages less driving power is required ; the repair cost is reduced to a minimum ; absolute rigidity is ensured and total absence of vibration.

The Headstock, Middle Slips, Copping Motion, Outside Quadrant Support, and Drawing-up Scroll Bearings are all fixed on long extra strong cast iron planed foundation plates which combine the whole in the most perfect and rigid manner.

The Driving or Rim Shaft is the lowest made, allowing a longer strap to be used, thereby securing smoothness in running.

Lower Creels for the same length or lift of bobbin.

The Quadrant Slide is fastened to the sector with tongues and grooves instead of being in one part, so that in case of replacement less expense is incurred.

Each Motion is separate and distinct, is easy of access and perfectly controllable.

The changes are effected by a strong wrought-iron lever ; they are made in less time than by the cam or any other motion.

Counter Shafts with Double Adjustable Hangers, permitting both down strap and counter strap to be jointless—with these hangers Mules run seven years without a strap having to be touched—a great saving in the piecing of belts, &c.

Ordinary or Patent “Duplex” Driving Arrangement.

Patent Automatic Band Governor or Strapping Motion, suitable for all counts of yarn. The cop bottoms are made automatically, no assistance being required from the minder. Tight and regular winding is also ensured during the building of the cop bottom. All strain upon the yarn is avoided, it being always at one uniform tension. Snarls, cut yarn, and waste prevented. For fine counts of yarn which require the least possible weight on the fallers the motion shows a sensitiveness to the difference in tension of the yarn unapproachable by any other motion.

Patent Automatic Nosing Motion which gives absolute certainty of a perfectly formed cop nose. Tight and regular winding throughout the entire length of cop is obtained and an increased length of yarn is put upon the cops. Slack winding, ruffled or fuzzy noses, bad cops, and waste entirely prevented. Less doffing is required; Winding Frame production is increased at less cost. It is self-adjusting and is suitable for all kinds and variations in taper of spindle blades. No alteration is required for any counts of yarn. The objectionable quadrant arm is dispensed with thus preventing breakages in the Mules when a quadrant band breaks.

Self-acting Strap Relieving Motion; it is very simple, and arranged so that the driving strap can be moved from the fast to the loose pulley.

Improved Backing-off Motion with extra large size backing-off cone which gives increased command over the rim shaft, thereby stopping it easily though instantaneously, thus causing a gain of time in changing.

Most approved Backing-off Chain tightening Motion to take up backing-off chain automatically as the cop builds; requires no attention.

Taking-in and Backing-off Motion driven by rope or strap.

Improved Safety Locking Motion which prevents all possibility of two motions coming into gear or acting at the same time.

Improved Long or Short Copping Rail.

Improved Full Cop Stopping Motion; cops of any length or containing any number of draws can be made with this motion. This motion is more particularly used for weft cops.

Safety or Stopping Motion to prevent accident or breakages in the Mule should there, by accident, anything get in the way of the carriages during their outward run; also an arrangement for stopping the carriages instantaneously during their inward run, if required.

Middle Length of Tin Roller Shaft with face plate or other couplings allowing of easy removal.

Tin Roller Pulleys in halves, if required.

Tin Roller Blocks with steel arbors.

Large Diameter of Rim Carrier Pulleys.

Swing Pulley Frames to take up slack of rim bands.

Carriages of extra strong construction.

One, two, or three threads to each boss of roller.

Cap Bars with fast or sliding nebs.

Improved Travelling Scavenger Motion, if required.

Mules made with Rim at back or at side, as illustrated.

Driving Pulleys 16 in. diameter, 5 in. wide.

Bottom Rollers case-hardened all over, or in the necks and squares only.

Top Rollers with or without loose bosses.

Bottom and Top Rollers of our own manufacture, recognised by the trade as the most perfect. Special Fluting and other details for delicate and difficult cotton.

Spindles of our own make, made from specially selected steel to stand the highest speeds.

Special arrangements for self-lubricating the bolsters and footsteps, if required.

All revolving parts exactly balanced.

ADDITIONS FOR SPINNING FINE COUNTS :—

Improved After-stretch Motion, complete absence of back lash.

Patent Faller Motion ; a certain preventive of snarls, less strain upon the yarn and tighter wound cops. The snail or spiral cam that controls the backing-off is the same that coils the yarn on the spindles when the faller rises, and the yarn is governed by the fallers just as much as desired.

Improved Winding Motion ; for description see page 95.

Improved Roller Turning Motion whilst twisting at the head.

Double-acting Pivoted Faller Weight Levers to ease strain on tender yarns.

Double-speed Driving Apparatus.

Faller Shafts on anti-friction bowls.

SPACE OCCUPIED :—

Multiply the number of spindles in the Mule by the space of spindles and for Mules with Rim Pulley at back of headstock add :—

For Mules 800 spindles each and under, 5 ft. $4\frac{1}{2}$ in.—the rollers being geared at out-end.

For Mules with over 800 spindles each, 6 ft. 0 in.—the rollers being geared at headstock.

For Mules with Rim Pulley at side of headstock add :—

For Mules 800 spindles each and under, 5 ft. $7\frac{1}{2}$ in.—the rollers being geared at out-end.

For Mules with over 800 spindles each, 6 ft. 3 in.—the rollers being geared at headstock.

The most usual width taken by a pair of Mules, 64 in. stretch, is as follows :—

From centre to centre of front rollers, 14 ft. 6 in.

From back to back of creels, 18 ft. 0 in.

From back to back of headstocks, 20 ft. 0 in.

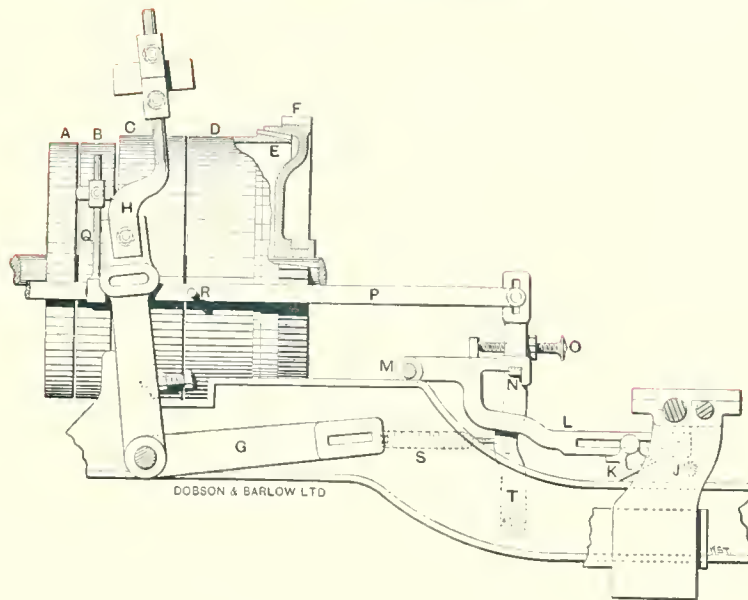
WE ARE ALSO MAKERS OF BILLEYS FOR SPINNING HARD OR SOFT WASTE INTO VERY LOW NUMBERS, AND ALSO FOR SPINNING VIGONIA AND OTHER YARNS.

SELF-ACTING MULES.

WEIGHTS AND CUBIC MEASUREMENTS.

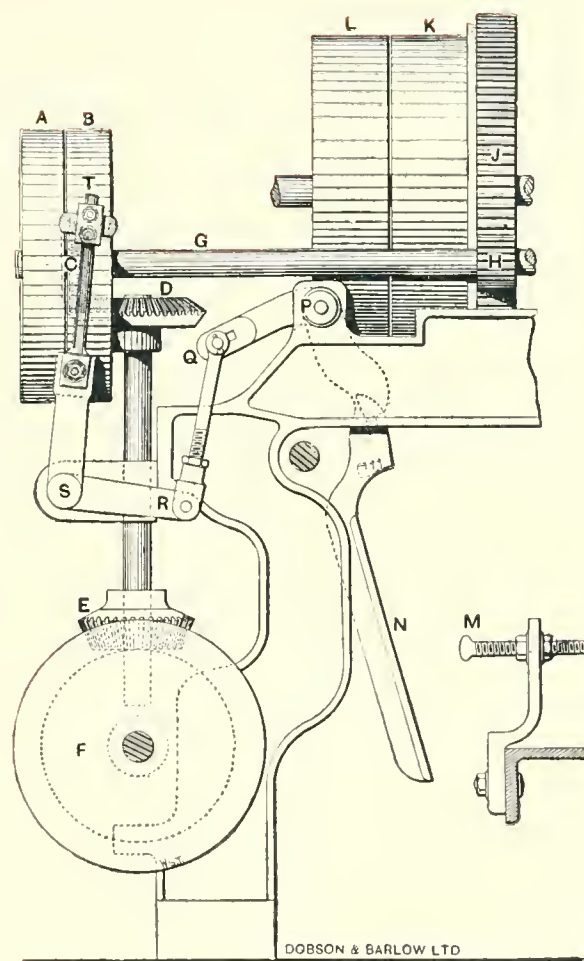
Spindles.	Space.	Without Weights.		Weights.		Cubic Measurement.		Kind of Weighing.
		Gross.	Net.	Gross.	Net.	Without Weights.	Weights only.	
	In.	Cwts.	Cwts.	Cwts.	Cwts.	Feet.	Feet.	
748	$1\frac{1}{8}$	160	119	7	$6\frac{1}{2}$	718	6	Saddle and Lever.
956	$1\frac{3}{16}$	188	141	9	$8\frac{1}{2}$	802	7	
844	$1\frac{1}{4}$	185	141	8	$7\frac{1}{2}$	770	7	
892	$1\frac{1}{4}$	200	147	$8\frac{1}{2}$	8	854	7	
1,000	$1\frac{1}{4}$	203	152	$9\frac{1}{2}$	9	875	7	
852	$1\frac{3}{8}$	194	151	7	$6\frac{1}{2}$	835	6	
1,000	$1\frac{3}{8}$	209	158	$9\frac{1}{2}$	9	886	7	
712	$1\frac{5}{8}$	193	148	$6\frac{1}{2}$	6	829	6	Dead Weights.
992	$1\frac{1}{16}$	196	151	28	$26\frac{1}{2}$	793	20	
848	$1\frac{3}{16}$	205	157	24	$22\frac{1}{2}$	790	16	
1,058	$1\frac{1}{4}$	213	164	30	28	850	22	
770	$1\frac{5}{16}$	192	146	22	$20\frac{1}{2}$	778	14	
838	$1\frac{5}{16}$	192	146	$23\frac{1}{2}$	22	803	15	
898	$1\frac{5}{16}$	234	193	$24\frac{1}{2}$	23	840	16	
814	$1\frac{3}{8}$	194	150	$23\frac{1}{2}$	22	803	15	
852	$1\frac{3}{8}$	206	164	$24\frac{1}{2}$	23	840	16	
1,050	$1\frac{3}{8}$	230	178	30	28	943	22	

IMPROVED WINDING MOTION.



This motion possesses many advantages over the older forms. Its object is to give, when spinning fine counts, an increased motion to the spindles previous to the carriage getting in, in order to wind on the slack yarn that results through the copping faller lifting. Snarls and cut yarns are consequently avoided. It is arranged so that it can be put into action up to within 8 inches of the finishing of the stretch.

Its action is as follows:—As represented in the drawing, the driving strap is supposed to be on the loose pulley C, and the winding strap on the loose pulley B; drawing-up is taking place and moving the carriage in. When this action is almost completed, a stud and bowl J, fixed on a portion of the carriage, comes into contact with the incline K on the lever L and lifts it up. As the lever, which is centred at M, is raised, a portion of it sets free a projection N on the lever T, which it has previously held in position, and immediately this happens the spring S pulls the lever T forward. The upper part of this lever is connected by means of a link-bar P to the strap fork Q, and its movement consequently changes the strap from the loose pulley B to the fast pulley A; at the same time the pin R on the bar P moves so that it is almost in contact with the strap fork H. When the driving strap is changed from C to D, it moves the bar P, by means of the pin R, back to its original position, and in doing so the winding strap is also moved from A to the loose pulley B.

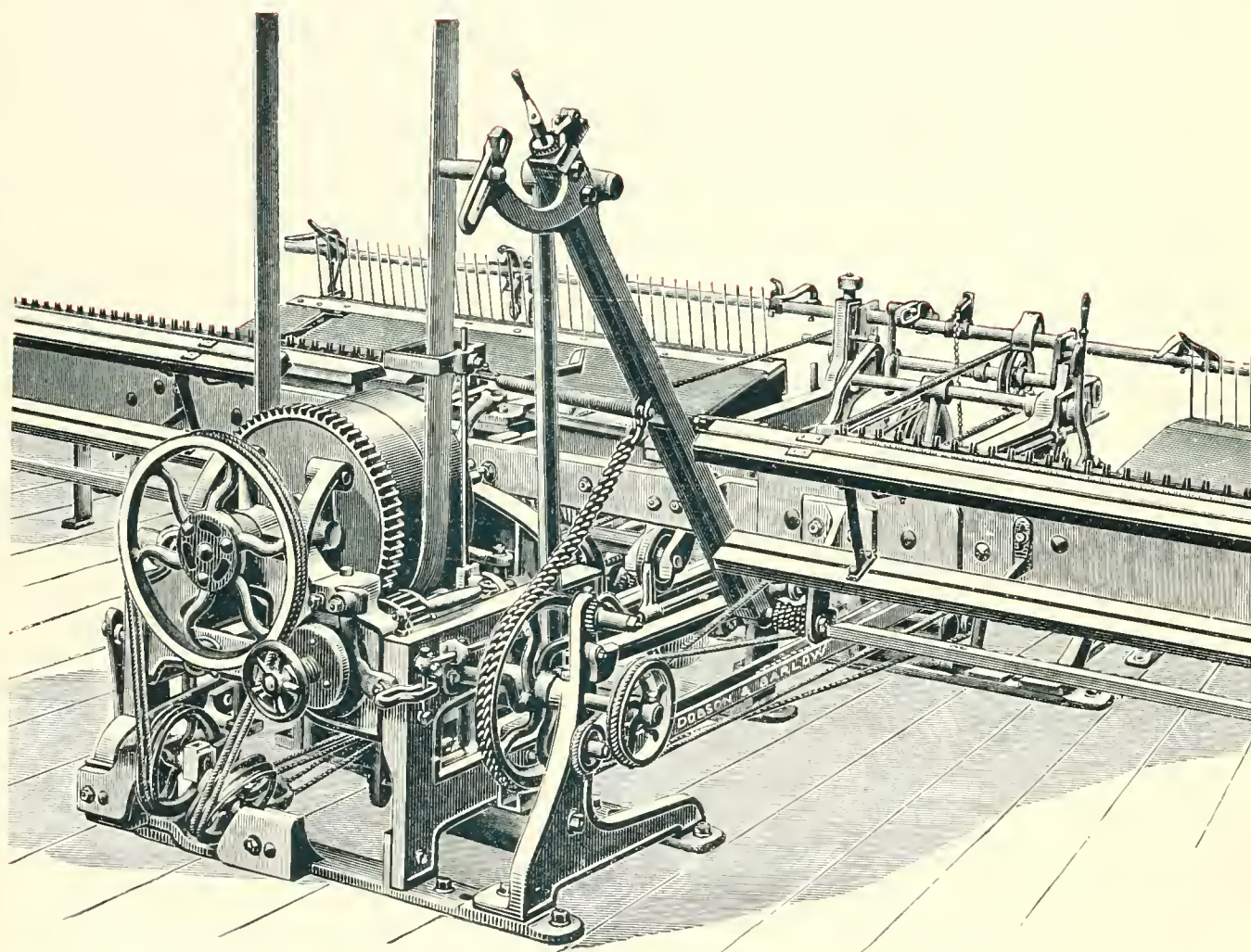


DRAWING-UP AND BACKING-OFF MOTION BY STRAP.

DRAWING-UP AND BACKING-OFF MOTION BY STRAP.

The illustration on the opposite page shows a greatly improved form of a combined Drawing-up and Backing-off Motion by means of a strap, and is specially arranged for spinning counts from 120's to 300's. Its action is of a very simple character, and easily understood from the drawing. When the motion is in the position shown, the strap will be on pulley B, and, through its connection with the bevel C, it will be drawing up the carriage by means of the scrolls on F. As the carriage moves in an adjusting screw M, fixed on the carriage square, comes into contact with the lever N and moves it in the same direction. This has the effect of changing the strap from the drawing-up pulley B on to the backing-off pulley A, which is keyed to the shaft G.

The amount of strap on the drawing-up pulley can be adjusted according to the speed required, the regulation being effected by a stop-rod and adjusting screw.



IMPROVED PATENT SELF-ACTING TWINER.

IMPROVED PATENT SELF-ACTING TWINER.

We make these Machines with travelling creels and stationary carriages, known as the Yorkshire Twiner, these being more generally used in this country; we also make them with stationary creels and travelling carriages as an ordinary Mule, these being known as the French Twiner.

The Machine is made on the simplest and most approved principle and contains all the improvements of the Self-acting Mule where applicable. It is strongly built; all the fitting surfaces are planed and the whole is finished in the most accurate manner.

Every facility is given for setting the various parts, all of which are easy of access.

For low repair cost, freeness of running and economy in driving power, the Machine stands unrivalled.

The Headstock rests upon extra strong cast iron planed foundation plates, which are very long, extending beyond the framing so as to form planed and solid beds for the radial arm and other bearings, combining the whole in the most perfect and rigid manner.

The Driving or Rim Shaft is the lowest made, allowing a longer strap to be used, thereby securing smoothness in running.

Counter Shafts with Double Adjustable Hangers, permitting both down strap and counter strap to be jointless—with these hangers the Machines run seven years without a strap having to be touched—a great saving in the piecing of belts, &c.

Ordinary or patent “Duplex” driving arrangement.

Patent automatic band governor motion. The cop bottoms are made automatically, no assistance being required from the minder. Tight and regular winding is also ensured during the building of the cop bottom.

Polished Cast Iron Steps, 4in. wide, to support the Rim Shaft. The Rim Block is forged upon the shaft, and the two, after having been turned and finished, are case-hardened.

Total absence of Back Lash. The connecting rod from shaper to quadrant being in one piece all joints and pins are avoided.

The Carriage Square is extra strong, and is supported upon four strong bowls which run on planed surfaces of the Headstock Framing.

Improved Copping Motion with double coping plates. This motion is securely fixed upon a strong iron bed, which keeps it perfectly free from vibration.

No Variation in the twist or turns per inch.

Improved Backing-off Motion with extra large size backing-off cone, which gives increased command over the rim shaft, thereby stopping it easily though instantaneously, and causing a gain of time in changing.

Most approved Backing-off Chain-tightening Motion to take up backing-off chain automatically as the cop builds; requires no attention.

Taking-in and Backing-off Motion driven by rope.

Improved Brass Locking Motion. No ledgings for accumulation of dirt, &c. Perfect grip of Lock. No cutting of yarn.

Self-acting Strap Relieving Motion; it is very simple, and arranged so that the driving strap can be moved from the fast to the loose pulley. No slack yarn in unlocking of the slide.

Safety or Stopping Motion to prevent accident or breakages in the Twiner should there, by accident, anything get in the way of the carriages during their outward run; also an arrangement for stopping the carriages instantaneously during their inward run, if required.

Each Motion is separate and distinct, and is secured against breakages from mischanges. One Motion must act before the next motion takes place.

Creels adapted for doubling from cops or bobbins, or from Winding Frame bobbins.

Middle Length of Tin Roller Shaft with face plates or other couplings allowing of easy removal.

Tin Roller Pulleys in halves, if required.

Tin Roller Blocks with steel arbors running in swivel bearings.

Large Diameter of Rim Carrier Pulleys.

Carriages of extra strong construction.

Driving Pulleys 16in. diameter, 5 in. wide.

Various kinds of Water Troughs.

Spindles of our own make, made from specially selected steel to stand the highest speeds.

Special arrangements for self-lubricating the bolsters and footsteps, if required.

All revolving parts exactly balanced.

Single-speed Driving Apparatus.

Faller Shafts on anti-friction bowls, if desired.

SPACE OCCUPIED :—

Yorkshire Twiner. Multiply the number of spindles in the Twiner by the space of spindles, and add 5ft. 2½ in. for space occupied by headstock, etc. Width of a pair of Twiners, 70in. stretch, is as follows :—from outside to outside of faller rods, 19ft. 8in.; from back to back of headstocks, 21 ft. 4in.

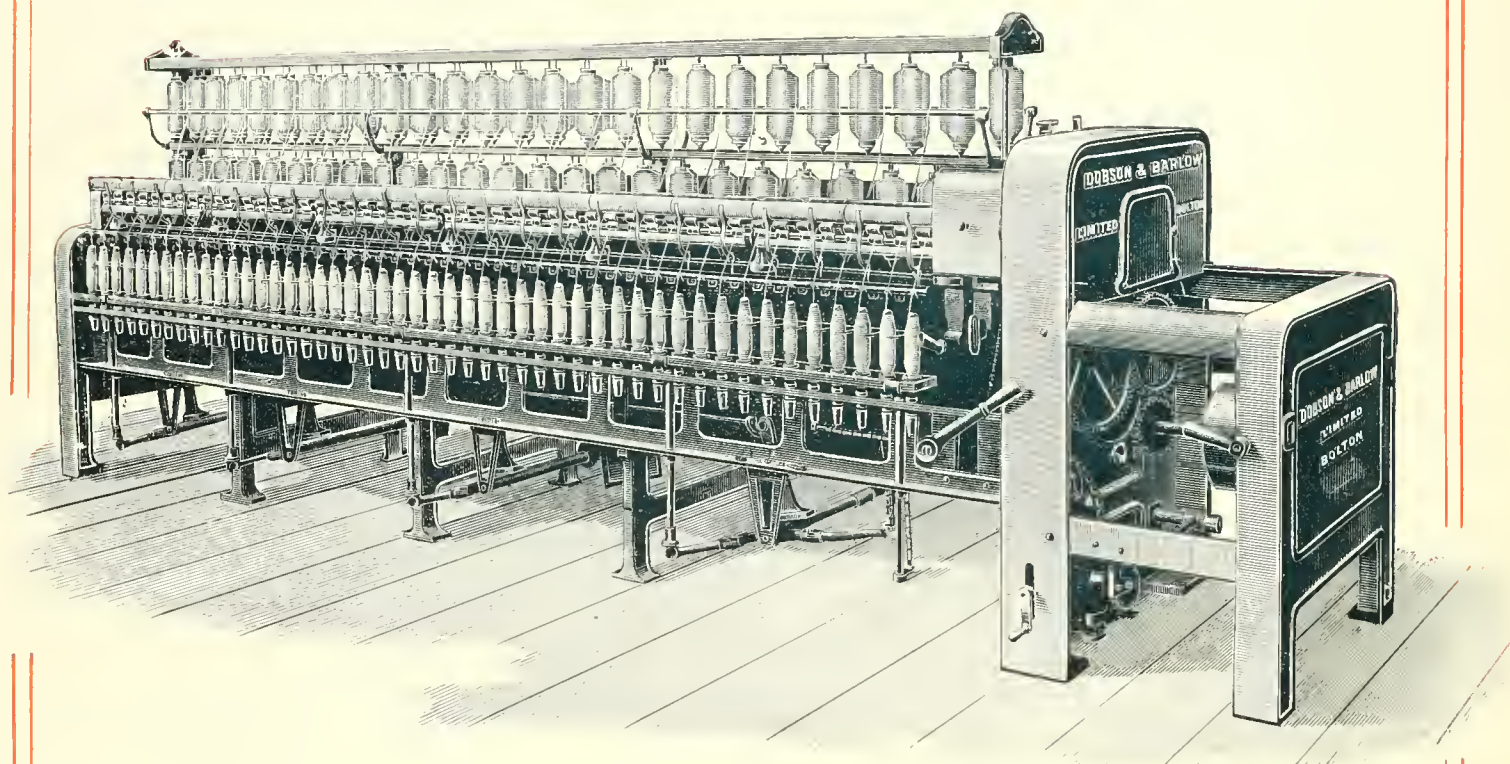
French Twiner. Multiply the number of spindles as above, and add 5ft 4½ in. for headstock, etc. Width of a pair of Twiners, 64in. stretch :—from back to back of creels, 18ft. 0in.; from back to back of headstocks, 20ft. 0in.

WEIGHTS AND CUBIC MEASUREMENTS.

Spindles.	Space.	Gross.	Net.	Cubic Measurement.
	In.	Cwts.	Cwts.	Feet.
816	$1\frac{5}{16}$	160	118	762
926	$1\frac{3}{8}$	173	130	810
970	$1\frac{3}{8}$	177	132	855
916	$1\frac{1}{2}$	179	134	873

RING SPINNING FRAME

TO SPIN TWIST ON WOOD BOBBINS OR PAPER TUBES, AND WEFT ON WOOD PIRNS OR PAPER TUBES; ALSO TO SPIN SILK, WORSTED, WOOL AND OTHER FIBRES.



These Frames possess many advantages and are acknowledged to be of the most perfect type. They are rigidly built, the patterns having been very carefully designed to embody strength with neatness and accuracy.

All jointings or fitting surfaces are planed or milled.

The Machines are spinning most successfully Cotton, Silk, Wool, and Merino Yarns.

The changes in the twist or draft can be made by simply turning back a cover and altering the respective wheels.

The Quick Running Wheels are coarser in pitch than the Slow Running Wheels, which causes fewer breakages.

All Wheels run on cast iron studs with best oiling arrangements.

Adjustable Screws for spring piece feet.

Roller Stands are made any angle from 5 to 35 degrees and are bushed with brass for all lines of rollers.

The Rollers can be arranged to be self-weighted, dead-weighted, or lever-weighted. Turn Over Cap Bars.

Improved Automatic Knocking-off Motion to stop the Machine when the bobbins are full for weft frames.

Flat or Upright Creels of iron or wood with pot steps for single or double roving.

Improved Ring Rail Lifting Motion, can be worked by chains and blocks or with balanced levers.

All Roller Gear Wheels and draft pinions have cut teeth.

Strong Iron Planed and Polished Roller Beams, Ring Plates, and Spindle Rails.

Improved Thread Board Lifting Motion with snarl preventor thread wires.

Improved Copping Motion.

Improved Traverse Motion.

Strong Double Tin Rollers driven direct by rope pulleys with rope tightening apparatus to secure more positive twist and to save banding.

Patent Anti-ballooning Plates with patent automatic knocking off motion. The application of this motion enables a larger ring to be used, facilitates the spinning of soft yarn, increases the production, the quality is improved, and the yarn is smoother and more elastic.

Steel Rings made from special forgings.

Loose Boss Top Rollers to front line, if required.

Bottom Rollers Case-hardened all over, or in the necks and squares only.

All working parts are well provided with the necessary lubricating arrangements.

Bottom and Top Rollers of our own manufacture, recognised by the trade as the most perfect. Special fluting and other details for delicate and difficult cotton.

Patent "Simplex" Self-contained Flexible Spindle.

Patent "Simplex" Flexible Spindle with self-lubricating attachment; stoppage of spindles not required whilst re-oiling—no displacement of bands; no pumping out of dirty oil—oil cups can be taken off, dirty oil removed, cups refilled and attached whilst spindles are in motion; spindles only require oiling every three to four months. These spindles can be made to run both twist and weft way, as required, and will lubricate themselves in the most effective manner, as well at 15,000 revolutions per minute as at 6,000 without any vibration.

We are also extensive makers of many other kinds of Ring Spindles, but after careful and exhaustive trials the "Simplex" Spindle has proved itself to run the lightest, owing to the small amount of frictional bearing.

IMPORTANT.

Great evils arise through bad-fitting bobbins and unsuitable oil. The greatest care should therefore be exercised in the selection of both, otherwise, good and satisfactory results cannot be obtained.

SPACE OCCUPIED.

Multiply half the number of spindles in the frame by the space of the spindles, and add for gearing, etc., as follows:—Gallows pulley driving.—2ft. 9in. for single-driven frames, and 4ft. 7in. for double driven frames. Direct driving by half-twisted strap.—3ft. 3in. for single-driven frames. Gallows pulley driving is invariably used for double-driven frames.

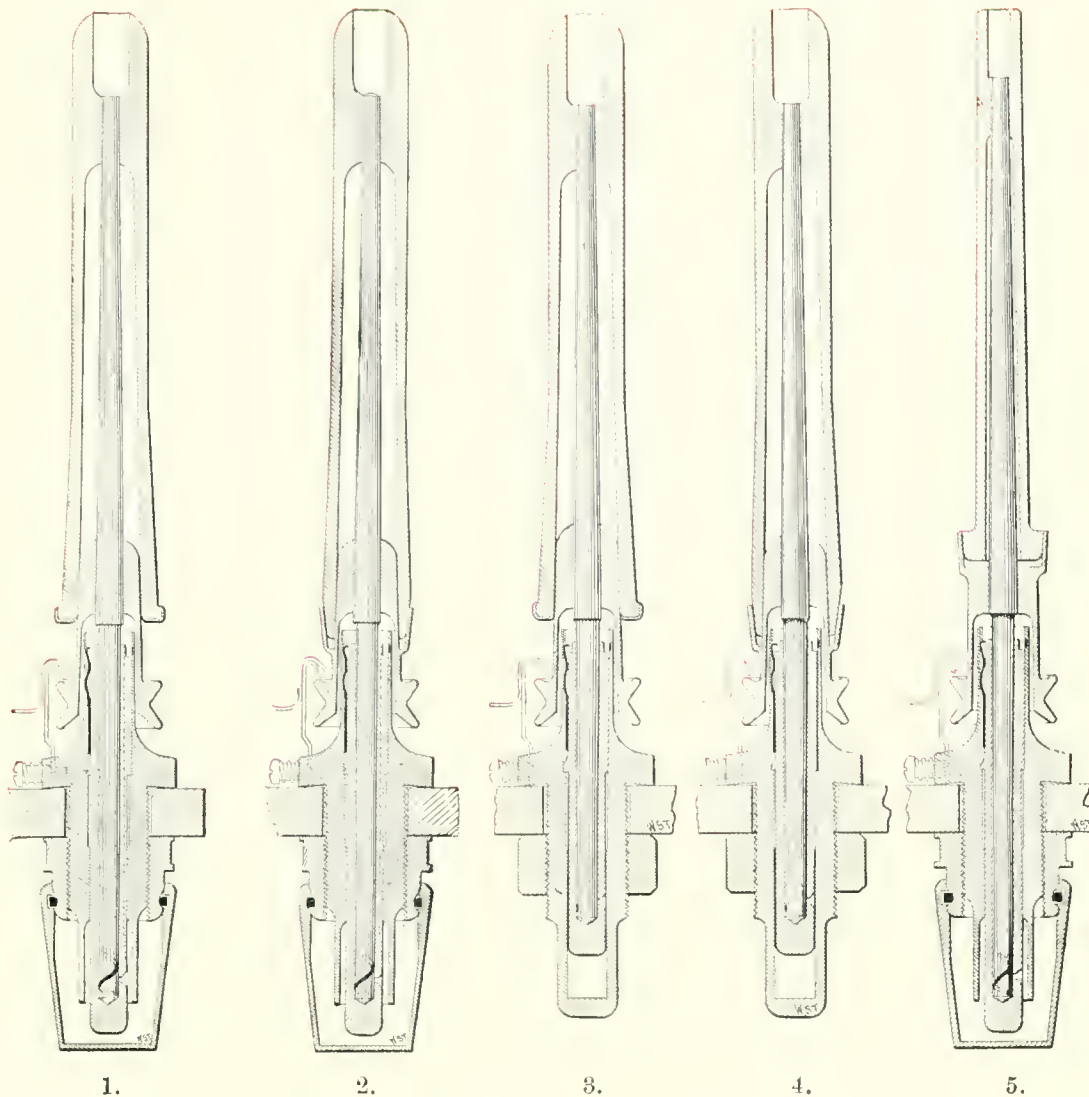
Width of frame.—3ft. 0in.

WEIGHTS AND CUBIC MEASUREMENTS.

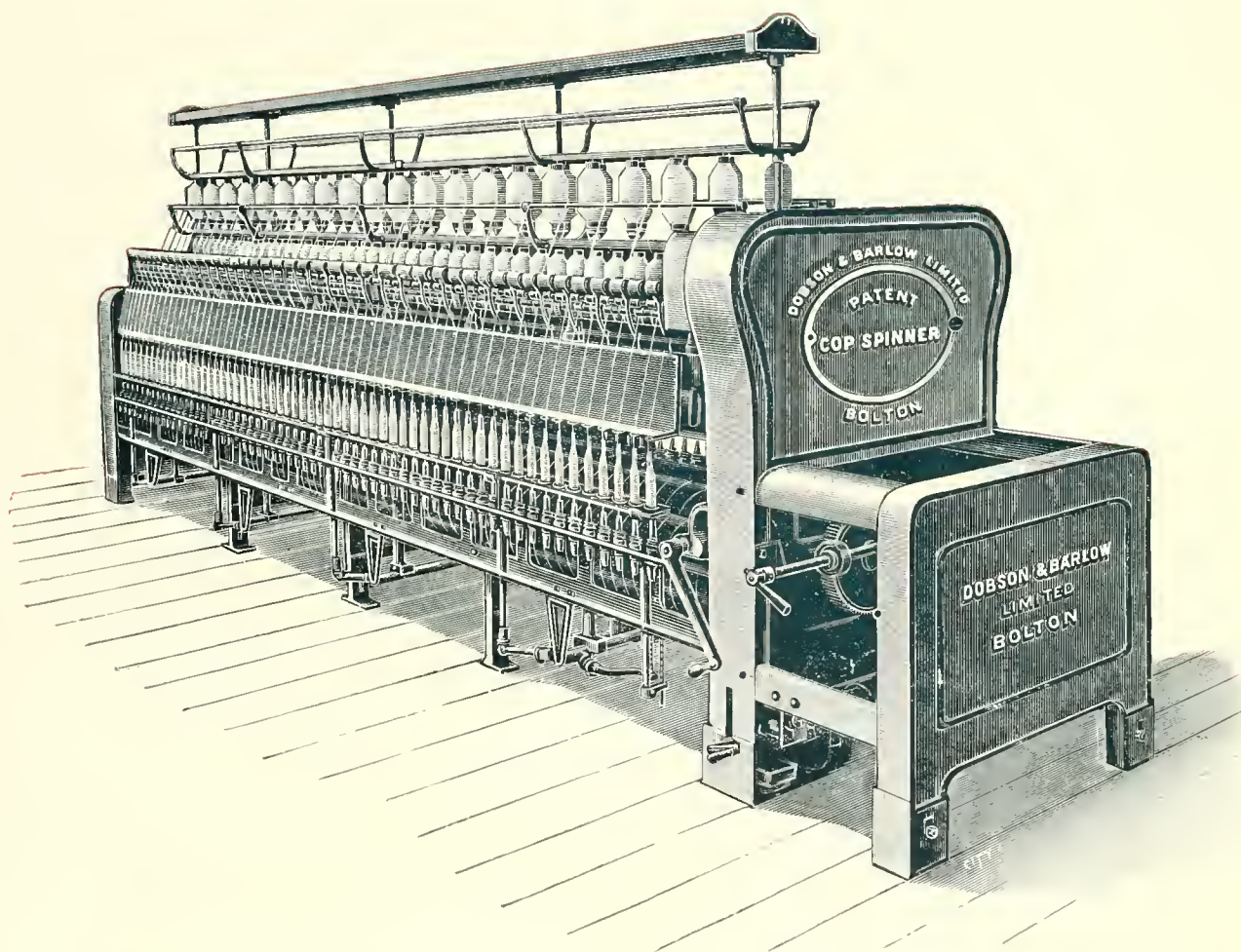
Spindles.	Space.	Without Weights.		Weights.		Cubic Measurement.		Kind of Weighting.
		Gross.	Net.	Gross.	Net.	Without Weights.	Weights only.	
	In.	Cwts.	Cwts.	Cwts.	Cwts.	Feet.	Feet.	
344	2 $\frac{1}{4}$	82	56	7	6 $\frac{1}{2}$	416	7	Saddle and Lever.
380	2 $\frac{1}{4}$	86	59	8	7 $\frac{1}{2}$	430	9	
360	2 $\frac{1}{2}$	87	61	7 $\frac{1}{2}$	7	408	6	
296	2 $\frac{1}{2}$	80	55	9	8 $\frac{1}{2}$	405	7	
280	2 $\frac{5}{8}$	82	55	6 $\frac{1}{2}$	5 $\frac{1}{2}$	419	6	
336	2 $\frac{5}{8}$	92	60	7	6 $\frac{1}{2}$	425	6	
400	2 $\frac{5}{8}$	93	66	8 $\frac{1}{2}$	8	490	7	
352	2 $\frac{3}{4}$	84	60	8 $\frac{1}{2}$	8	411	7	
268	2 $\frac{7}{8}$	76	52	6	5 $\frac{1}{2}$	363	6	
400	2 $\frac{1}{2}$	95	70	25	21	437	18	Dead Weights.
336	2 $\frac{5}{8}$	88	61	21	19 $\frac{1}{2}$	417	17	
384	2 $\frac{5}{8}$	96	69	24 $\frac{1}{2}$	23	451	16	
260	2 $\frac{3}{4}$	76	53	16	15	364	12	
320	2 $\frac{3}{4}$	92	65	20	19	408	17	

WE ARE ALSO MAKERS OF FLIER THROSTLE FRAMES WITH OR WITHOUT LONG COLLARS, AND WITH ALL THE MOST RECENT IMPROVEMENTS.

PATENT "SIMPLEX" FLEXIBLE SPINDLES.



1. With self-lubricating attachment but without bobbin cup.
2. „ „ „ and bobbin cup.
3. Self-contained spindle without bobbin cup.
4. „ „ with „ „
5. Weft spinning spindle with self-lubricating attachment.



PATENT COP SPINNER FOR SPINNING AND DOUBLING COTTON, WOOL,
WORSTED, SILK AND OTHER FIBRES.

PATENT COP SPINNER

FOR SPINNING AND DOUBLING COTTON, WOOL, WORSTED,
SILK, AND OTHER FIBRES.

This machine is arranged to spin twist or weft cops upon the bare spindle, and thus dispense with the use of bobbins, pirns, or paper tubes. We also make the machine to double two-fold yarns into cops.

The cops when spun are ready for the weaver, as in the case of cops spun on self-acting mules.

The building motion employed is on an improved principle, which ensures the making of firmly built cops and such as can be easily "readied" by the weaver.

The distance of the spindles, from centre to centre, ranges from $2\frac{1}{2}$ to 3 in., according to size of cops required.

A cop made on this frame contains as great a length of yarn as that of a mule cop of similar size.

The frames are built in other respects the same as our Ring Spinning Frames.

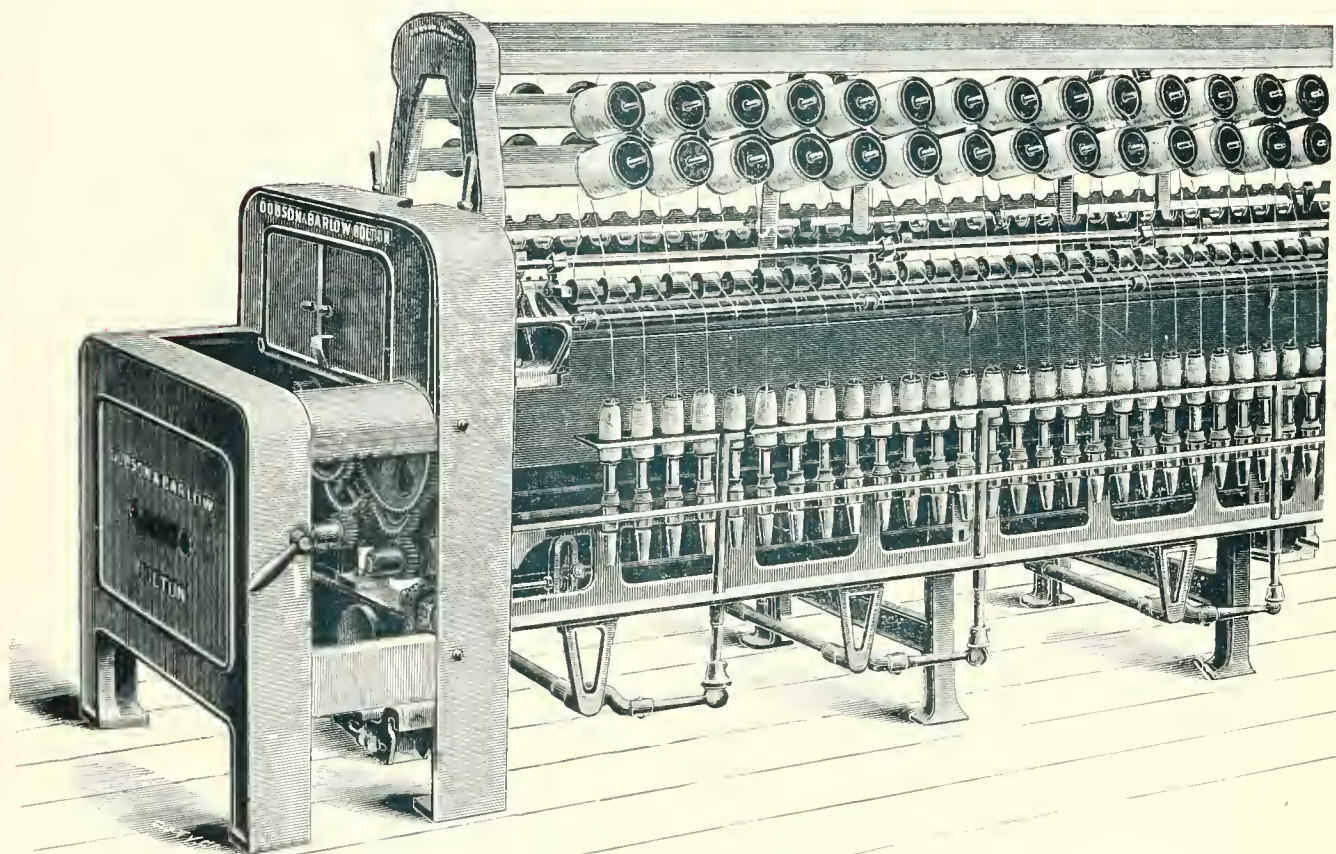
SPACE OCCUPIED.

Multiply half the number of spindles in the frame by the space of the spindles and add for gearing, etc., as follows:—Gallows pulley driving.—2ft. 9in. for single-driven frames, and 4ft. 7in. for double driven frames. Direct driving by half-twisted strap.—3ft. 3in. for single driven frames. Gallows pulley driving is invariably used for double-driven frames.

Width of Frame—3ft. 0in.

RING DOUBLING FRAME

ON THE ENGLISH AND SCOTCH SYSTEMS FOR DOUBLING ALL KINDS OF SEWING COTTONS, KNITTINGS, NETTINGS, SAIL YARNS, AND HEALD YARNS; ALSO FOR DOUBLING WOOL, WORSTED, SILK, AND OTHER FIBRES.

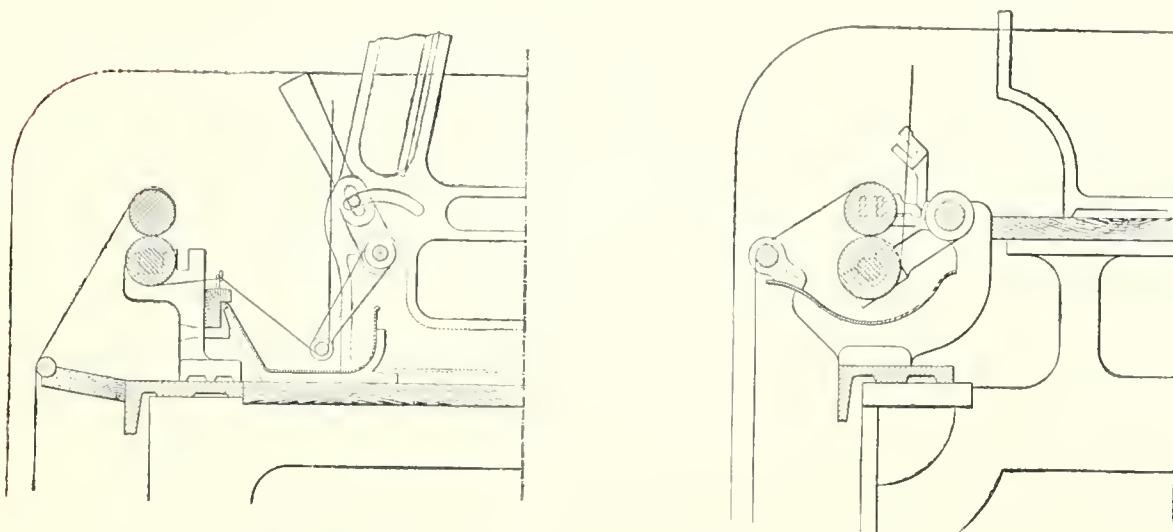


These Frames, like the Ring Spinning Frames, are made in the most complete and accurate manner. They comprise everything that could be desired to give the very best results.

We make these Frames for dry doubling with polished iron top and bottom rollers.

We also make them for wet doubling with top and bottom rollers of iron covered with brass, and continuous troughs of zinc or copper with arrangement

for lifting glass cane out of water; also with top rollers of iron covered with brass and bottom rollers of hollow brass, working in a continuous copper trough, with improved arrangement for raising the rollers out of the water whilst cleaning the trough, &c. We show below sections of roller beam and troughs as referred to above.



Improved Traverse Motion—applied to Frames with hollow brass bottom rollers.

Improved Patent Knee Brake or Spindle Stop Motion—can be applied to spindles with or without self-lubricating attachment, or spindles of other make.

Strong Single Tin Roller, or

Strong Double Tin Rollers driven direct by rope pulleys with rope tightening apparatus to secure more positive twist and to save banding.

Most Approved Arrangement for Changing Twist and for oiling purposes.

The Gearing is arranged so that different counts can be doubled on each side of the Frame at the same time.

We also make Frames arranged to be driven by band instead of strap.

Creels of any pattern for doubling from cops, Ring Frame bobbins, Winding Frame bobbins, or Throstle bobbins with heads.

Less breakages in the quick running wheels as they are coarser in pitch than the slow running wheels.

All wheels run on cast iron studs with best oiling arrangements.

Improved Ring Rail Lifting Motion, can be worked by chains and blocks or balanced levers.

Strong Iron Planed and Polished Roller Beams, Ring Plates, and Spindle Rails.

Steel Rings made from special forgings.

All working parts are well provided with the necessary lubricating arrangements.

Bottom and Top Rollers of our own manufacture, recognised by the trade as the most perfect.

Patent "Simplex" Flexible Spindle with self-lubricating attachment; stoppage of spindles not required whilst re-oiling—no displacement of bands; no pumping out of dirty oil—oil cups can be taken off, dirty oil removed, cups refilled and attached whilst spindles are in motion; spindles only require oiling every three to four months. These spindles can be made to run both twist and weft way, as required, and will lubricate themselves in the most effective manner.

We are also extensive makers of many other kinds of Ring Spindles, but after careful and exhaustive trials the "Simplex" Spindle has proved itself to run the lightest, owing to the small amount of frictional bearing.

IMPORTANT.

Great evils arise through bad-fitting bobbins and unsuitable oil The greatest care should therefore be exercised in the selection of both, otherwise, good and satisfactory results cannot be obtained.

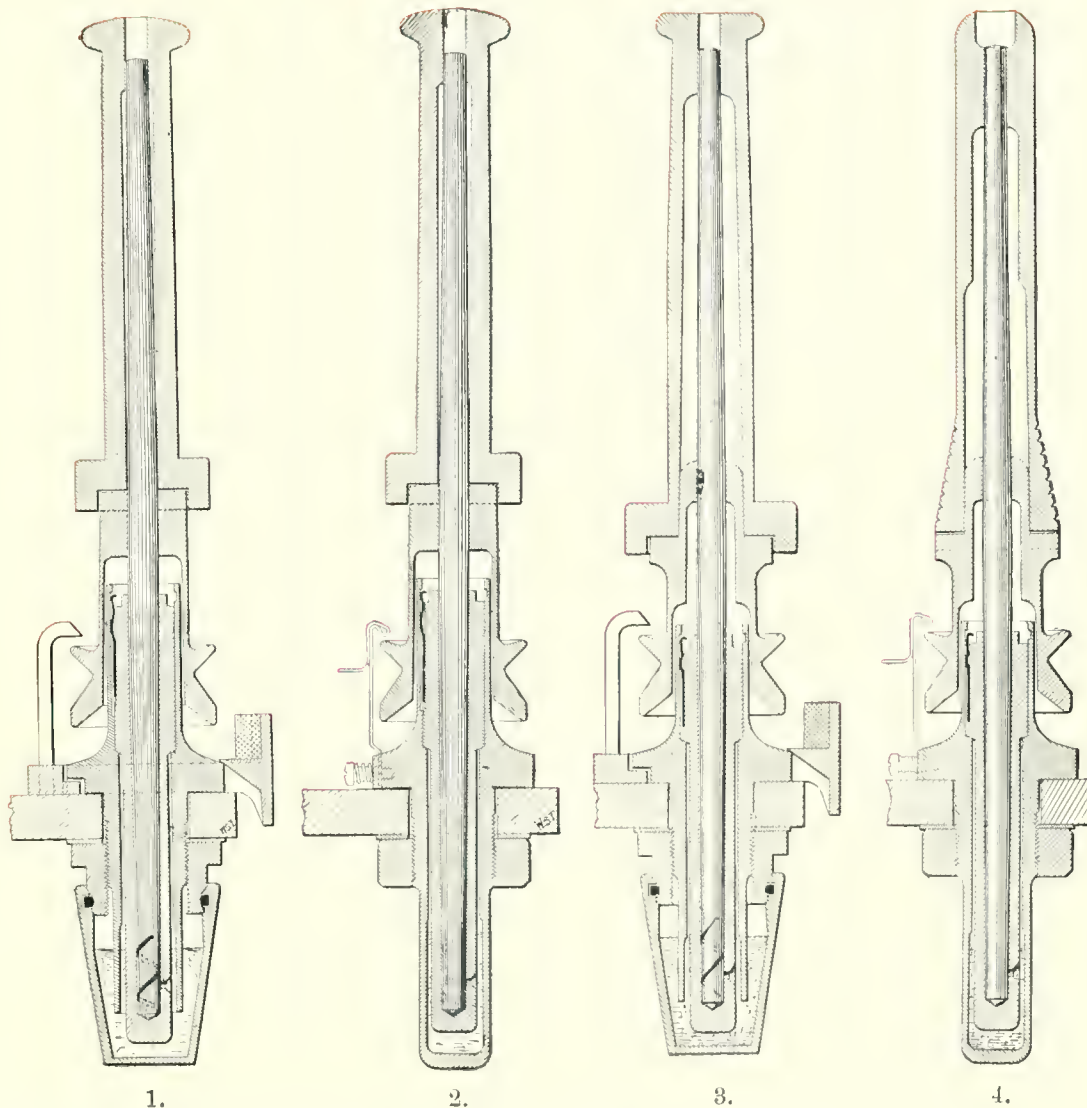
SPACE OCCUPIED:—

Multiply half the number of spindles in the Frame by the space of the spindles and add for gearing, etc., as follows:—Gallows pulley driving, 2ft. 9in. for single-driven frames, and 4ft. 7in. for double-driven frames. Direct driving by half twisted strap, 3ft. 3in. for single-driven frames. Gallows pulley driving is invariably used for double-driven frames. Width of frame, 2ft 10in. or 3ft. 0in., both with double tin rollers.

WEIGHTS AND CUBIC MEASUREMENTS.

Spindles.	Space.	Without Weights.		Weights.		Cubic Measurement.	
		Gross.	Net.	Gross.	Net.	Without Weights.	Weights only.
	In.	Cwts.	Cwts.	Cwts.	Cwts.	Feet.	Feet.
160	2½	53	35	1½	1	236	2
360	2½	98	69	3½	3	444	2½
426	2½	106	81	4	3½	496	3
220	2¾	77	52	2½	2	376	2½
260	2¾	82	57	3	2½	395	3
300	2¾	87	62	3	2½	410	3
380	2¾	98	71	3½	3	446	3
200	3	75	51	2	1¾	371	2½
286	3	92	66	3	2½	409	3
186	3¼	79	53	3	2½	398	3
264	3¼	92	64	3	2½	430	3
150	4	78	52	2	1¾	386	2½

PATENT "SIMPLEX" FLEXIBLE SPINDLES.

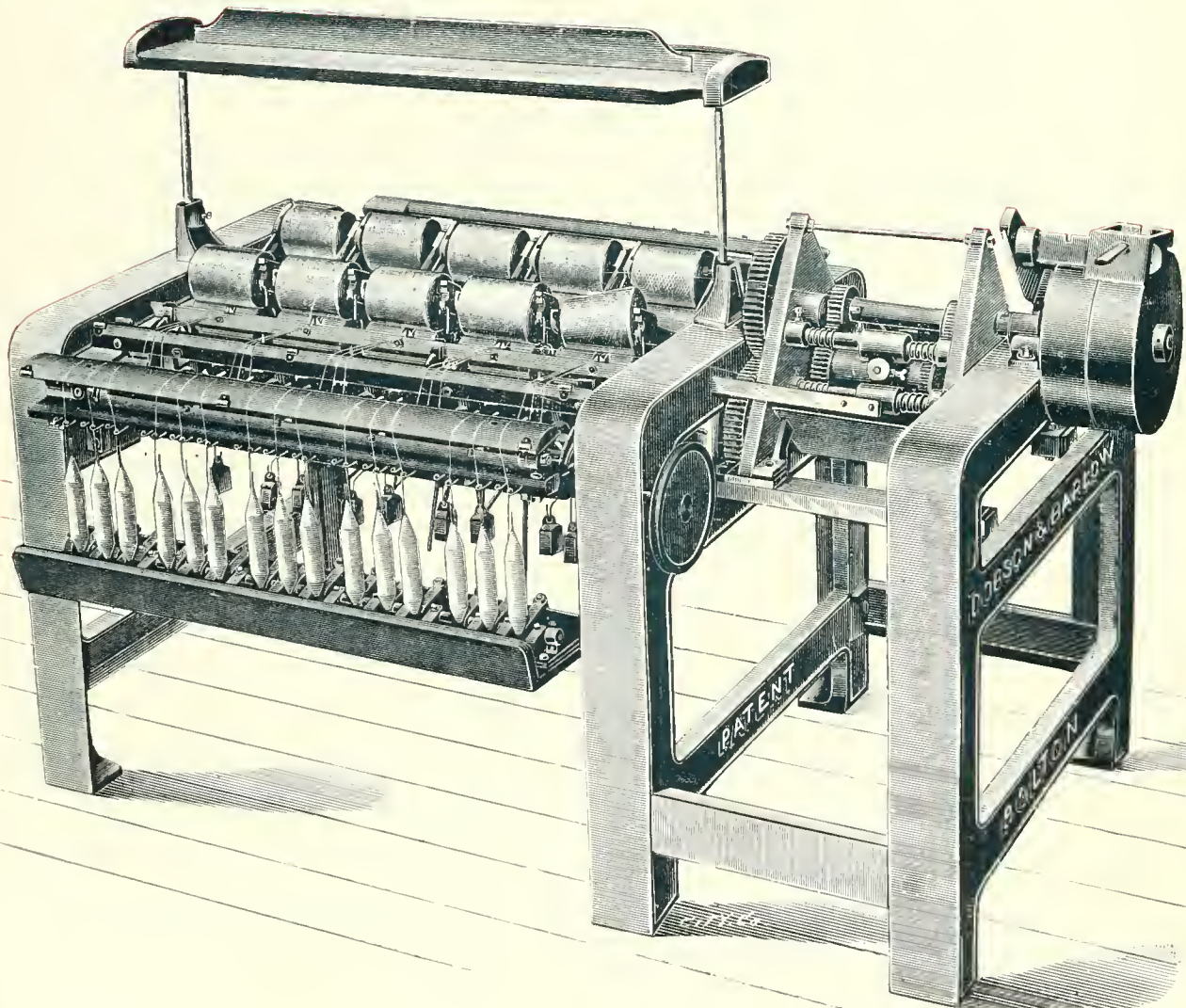


1. With self-lubricating attachment and patent knee brake.
2. Self-contained spindle—patent knee brake can be applied.
3. With self-lubricating attachment and patent knee brake.
4. Self-contained spindle for dry doubling. Self-lubricating attachment and patent knee brake can be applied.

*WE ARE ALSO MAKERS OF FLIER DOUBLING FRAMES WITH ALL THE
MOST RECENT IMPROVEMENTS.*

PATENT QUICK TRAVERSE DRUM WINDING FRAME.

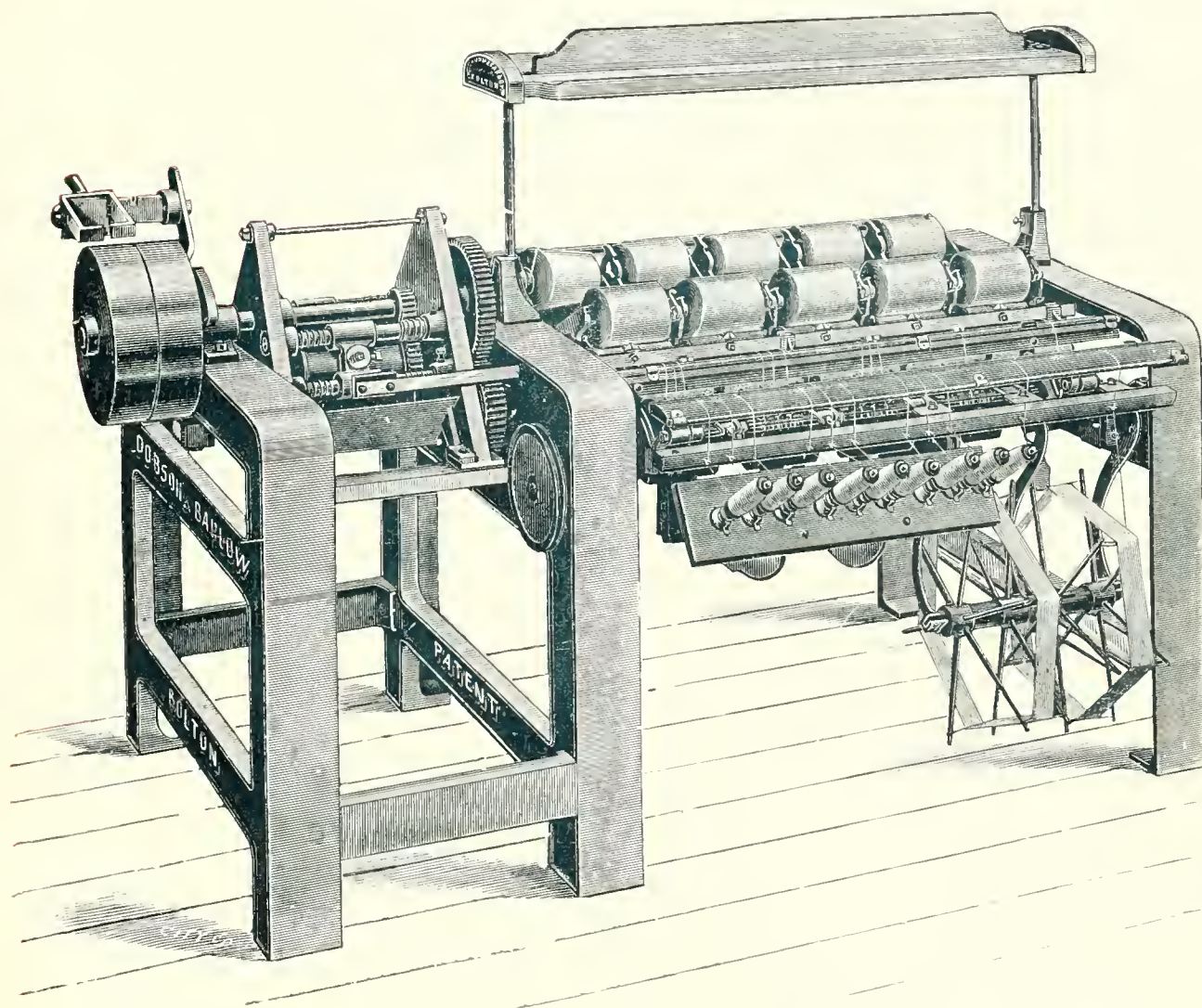
WITH OR WITHOUT STOP MOTION.



This Machine is acknowledged to be the best yet brought before the notice of the public. It is the simplest, most handy, and will do a greater variety of work than any other Winding Frame made.

It is suitable for cotton, wool, worsted, silk, linen, or any other kind of fibre.

It will make Parallel or Cone-shaped bobbins. We can also apply our patented Tapering Motion to make bobbins with tapered ends when winding from hard twisted yarn or polished thread.



It can also be adapted for slow traverse to wind on to bobbins with heads.

1^s. to 100^s. wound with the same size of needles. Needles changed for any number of ends or kind of yarn without displacing anything.

Will wind any number of ends from one to six.

Instantaneous Stop Motion to each end. No over-running. Less Waste.
 Bobbins made any size from $2\frac{1}{4}$ in. to 6in. lift \times 9in. dia. on same Machine
 by changing cam only. No twisting or intermingling of ends. Uniform
 drag. No cork-screwing.

Will wind from cops, hanks, or any kind of bobbins. No removal of the bobbins
 from their bearings whilst piecing up. After piecing up the ends the
 bobbins are put in motion at the same time as the break motion is taken
 off, thus working two motions with one action.

Five pounds of yarn can be put on a paper tube $1\frac{7}{16}$ in. dia. weighing $4\frac{1}{4}$ dwts.

Production :—15 lbs. of 50^s two-fold, per drum, per week of $56\frac{1}{2}$ hours.

THE FOLLOWING ADVANTAGES ARE CLAIMED FOR THIS MACHINE:

Economy in packing yarn for export.	No threading of guides.
„ „ cost of bobbins.	No stoppages for doffing.
„ „ cost of wages.	Less ordinary knots and no bunch knots.
„ „ creeling.	„ attention required.
Improved working in Warping Mills.	„ strain on yarn when winding and
Better tension for doubling or twisting.	unwinding.
Perfect selvages.	„ waste.

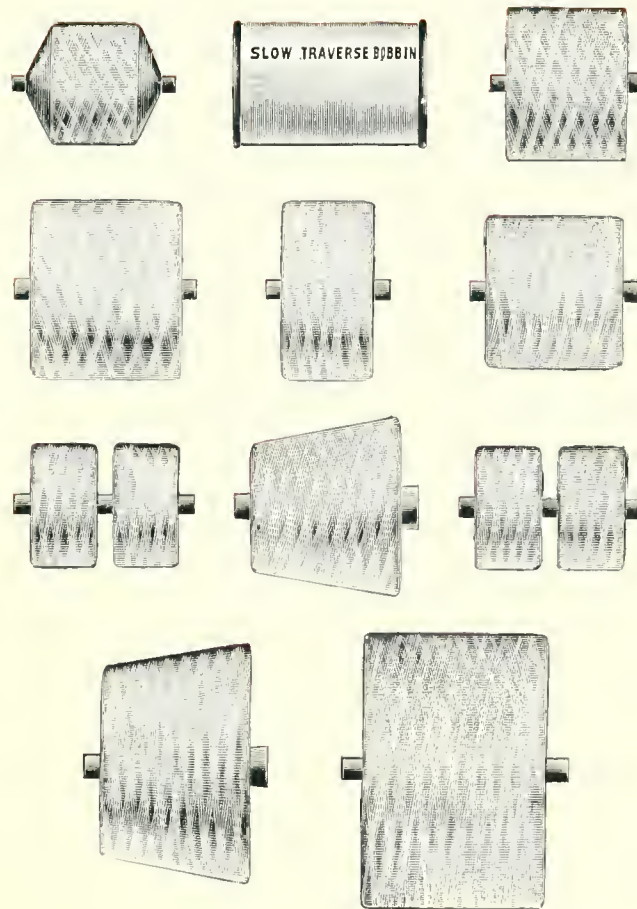
SPACE OCCUPIED.

Multiply half the number of drums in the Machine by $7\frac{1}{8}$ in. for $4\frac{1}{2}$ in. traverse,
 $7\frac{3}{8}$ in. for 5in. traverse, and $8\frac{5}{8}$ in. for 6in. traverse, and add for gearing,
 etc.:—3ft. 2in. for $4\frac{1}{2}$ in. and 5in. traverse, and 3ft. 3in. for 6in. traverse.
 Width of frame, 4ft. 3in.

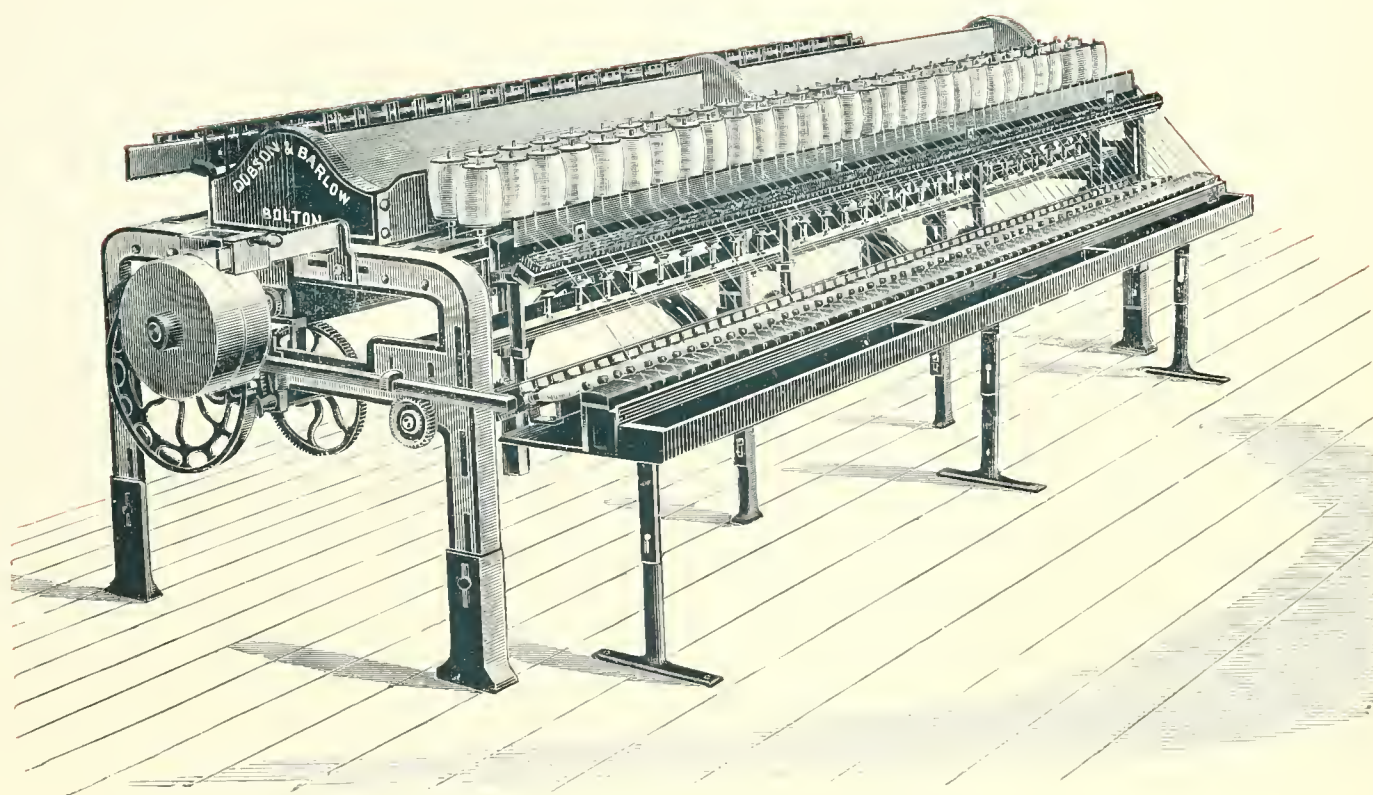
We have patterns for making Frames $4\frac{1}{2}$ in., 5in. and 6in. traverse, and have
 patterns of cams for $2\frac{1}{4}$ in., 3in., $3\frac{1}{4}$ in., $3\frac{1}{2}$ in., 4in., $4\frac{1}{4}$ in., $4\frac{1}{2}$ in., $4\frac{3}{4}$ in., 5in.
 and 6in. traverse.

WEIGHTS AND CUBIC MEASUREMENTS.

No. of Drums.	Gross.	Net.	Cubic Measurement.
	Cwts.	Cwts.	Feet.
30	30	18	140
40	38	25	172
50	42	30	206
64	55	40	230
74	59	42	243
80	61	44	270
88	65	46	294
100	73	51	320



ILLUSTRATIONS OF CHEESES MADE ON PATENT QUICK TRAVERSE DRUM
WINDING FRAMES.



WINDING FRAME TO WIND FROM COPS OR RING SPINNING BOBBINS ON TO
WARPERS' BOBBINS.

WINDING FRAME

TO WIND FROM COPS OR RING SPINNING BOBBINS ON
TO WARPERS' BOBBINS.

This machine is made with strong iron polished spindle rails, best steel spindles in double rows, brass spindle collars, footsteps with rising screws for adjusting height of spindles, improved mangle wheel or heart traverse motion, as required, for making either barrellled or straight bobbins, steel yarn guides, strong tin roller, and cop or bobbin boxes as required.

Distance of spindles from centre to centre.— $4\frac{1}{2}$ in. to 5 in.

Lift of the bobbins.— $4\frac{1}{2}$ in. and 5 in.

We also supply the following extras when required:—

Best Bristle Brushes in continuous lengths.

Lancewood cop skewers.

Plain steel skewers or steel skewers with springs.

Wood bushes for ring spinning bobbins.

Adjustable yarn clearers.

Travelling apron for carrying away empty ring bobbins.

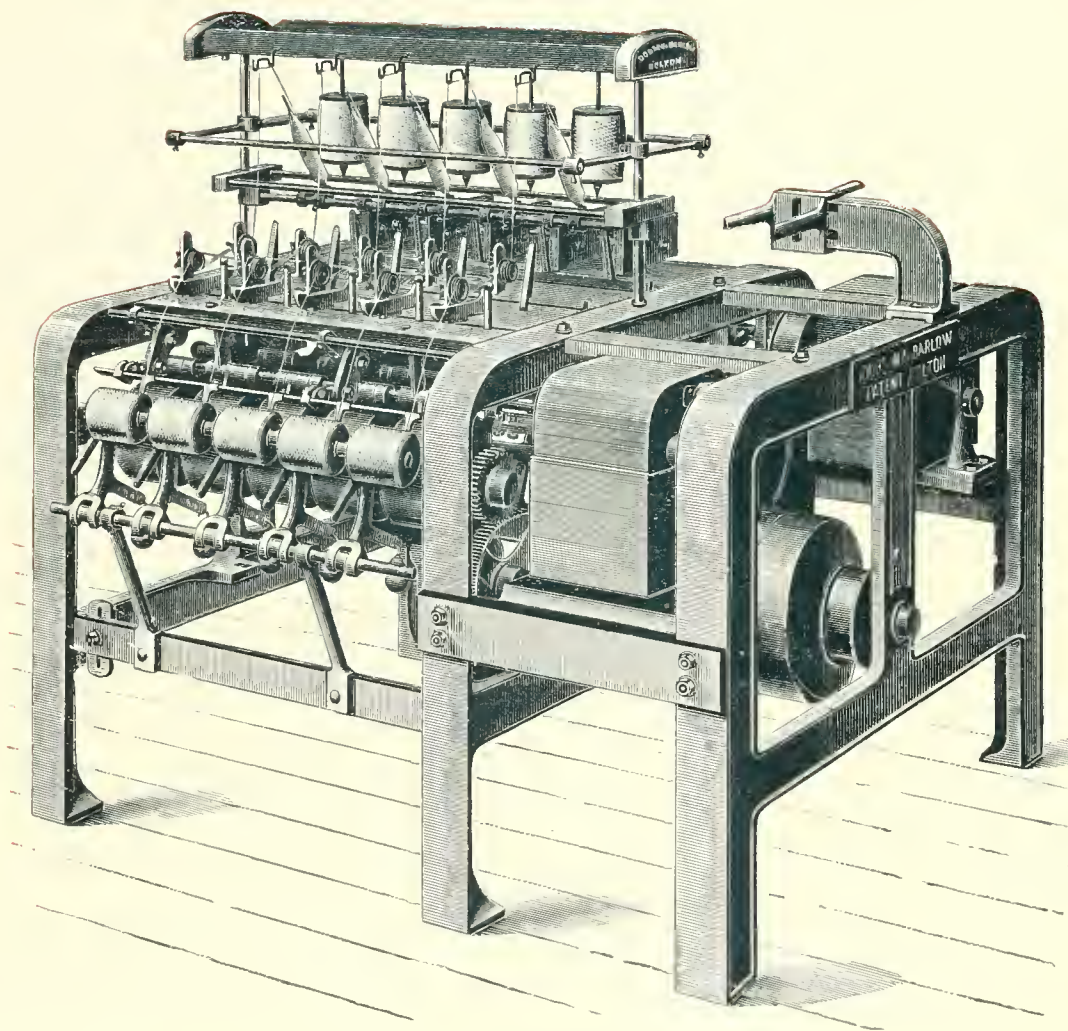
Revolving spindles in creel for ring bobbins.

SPACE OCCUPIED.

Divide the number of spindles in the frame by 4, then multiply by space or gauge of spindles, and add for gearing, etc., 2 ft. 2 in. Width of frame, 5ft 0in.

WEIGHTS AND CUBIC MEASUREMENTS.

Spindles.	Gross.	Net.	Cubic Measurement.
	Cwts.	Cwts.	Feet.
200	34	28	155
250	43	35	194
300	52	42	232



IMPROVED GASSING FRAME WITH PATENT QUICK TRAVERSE MOTION.

IMPROVED GASSING FRAME

WITH PATENT QUICK TRAVERSE MOTION.

This Frame is strongly built and embraces all the most recent improvements.

The gassed yarn is wound on to wooden tubes, dispensing with the expensive cost of bobbins with heads. The bobbins made on this principle can be reeled off endways instead of having to be reeled from a revolving spindle, consequently, bobbin reeling is dispensed with or converted into the process of cop reeling, which means that the speed of the reels can be more than doubled and a considerable saving in the cost of reeling.

Further than this, one Reeler could mind two reels when reeling from the bobbins referred to, even at the increased speed of the reel, with as little labour as would be required to mind one reel when reeling from bobbins with heads on the ordinary principle, thus causing a still greater saving.

Six times as much yarn can be put on the wooden tubes used on this frame as on the bobbins with heads used on other kinds of frames; this, of course, means less piecing and doffing, less waste and attention, fewer knots and increased production, with only one-sixth the creeling in the Reels.

Burners of different patterns can be supplied. Illustrations of the burners are given on page 121.

The patented quick traverse motion has been applied most successfully to some 30,000 to 40,000 drums of existing Frames and is being generally adopted.

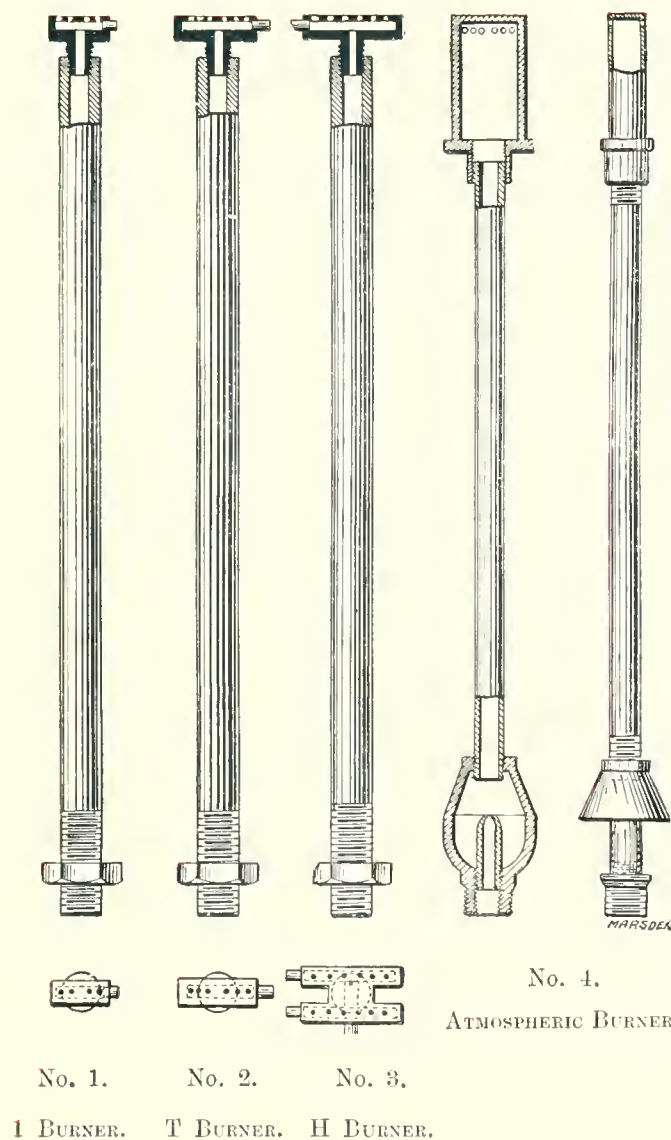
Multiply half the number of drums in the machine by $5\frac{1}{2}$ in., and add for gearing, &c., 2ft. 7in. Width of Frame, 4ft. 4in.

SPACE OCCUPIED.

We make the Frames for 3in. traverse, but have patterns of a cam $2\frac{1}{4}$ in. traverse which can be applied instead of that for 3in. traverse.

WEIGHTS AND CUBIC MEASUREMENTS.

No. of Drums.	Gross.	Net.	Cubic Measurement.	No. of Drums.	Gross.	Net.	Cubic Measurement.
	Cwts.	Cwts.	Feet.		Cwts.	Cwts.	Feet.
40	31	24	95	90	59	44	215
50	36	28	116	100	64	47	250
60	42	33	137	120	71	53	265
70	47	37	158	140	79	60	275
80	53	41	180	160	87	66	288

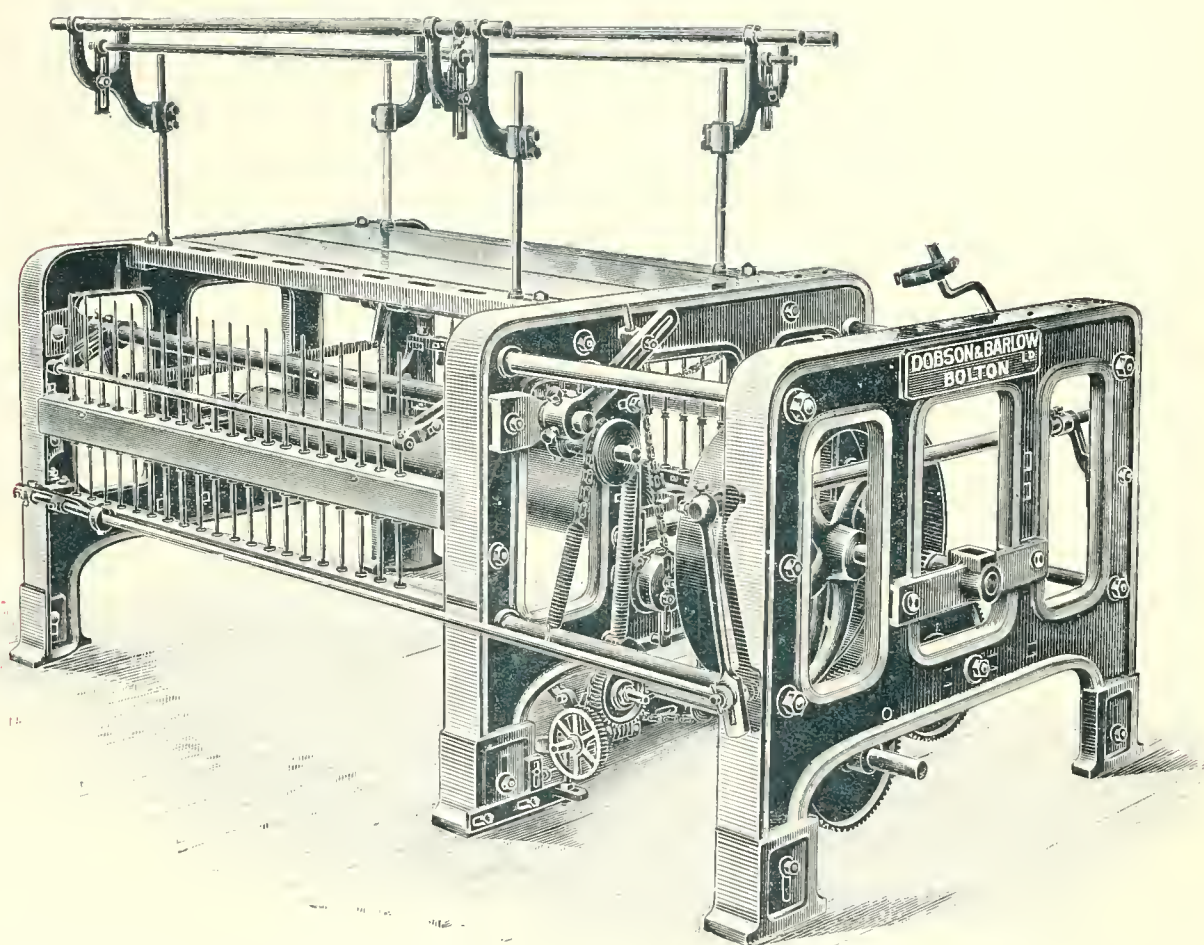


IMPROVED COPPING FRAME

FOR WINDING COTTON, WOOL, SILK, AND OTHER YARNS.

This machine is arranged to make cops either upon the bare spindle or upon paper tubes, from hanks, bobbins, or rejected mule cops.

It is provided with an improved building motion, which gives the necessary crossing, and thus produces firmly-built cops, and such as can be easily "readied" by the weaver.



Various lengths and thicknesses of cops can be made on this machine, and the traverse can be varied to suit requirements.

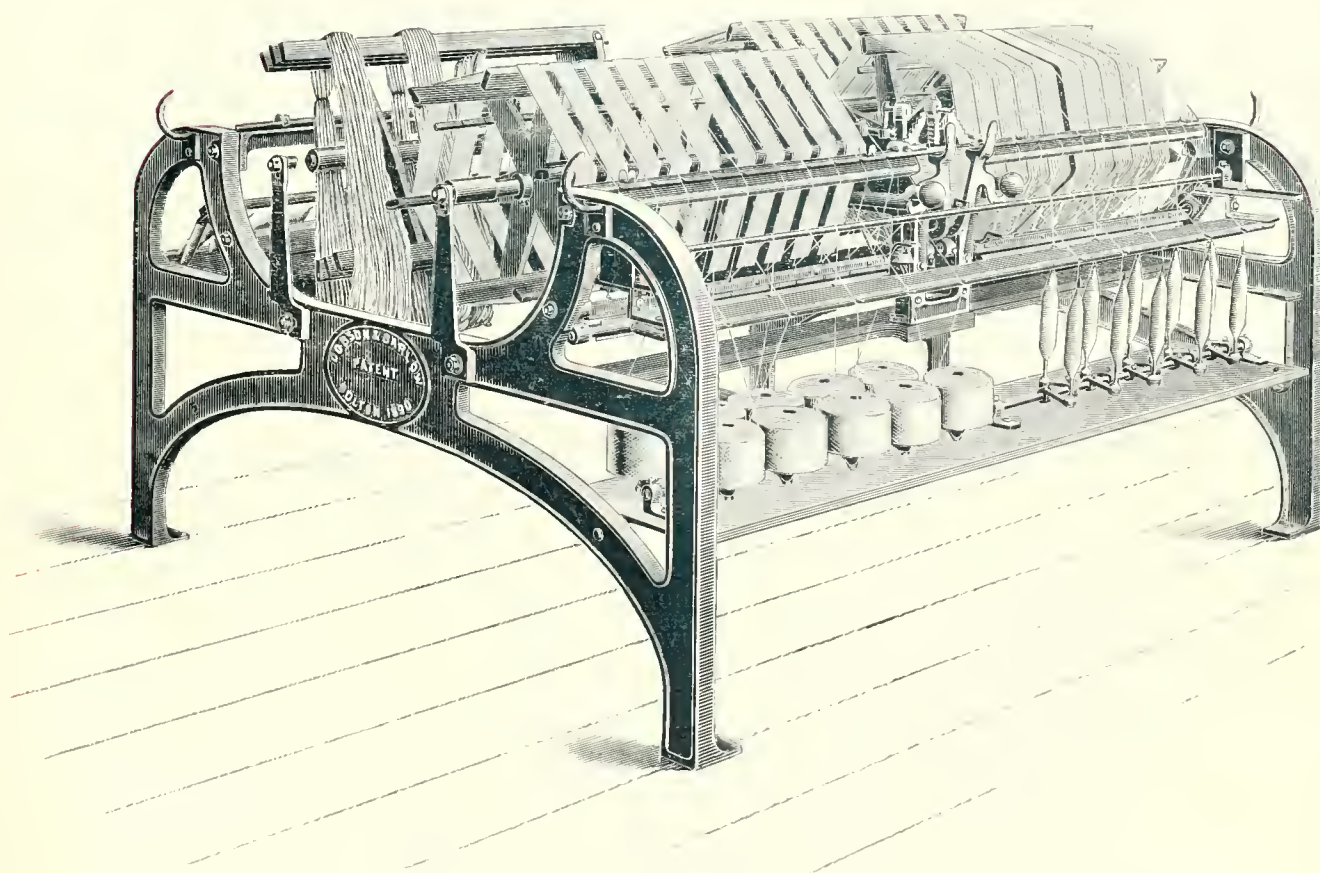
The distance of the spindles from centre to centre ranges from $1\frac{1}{2}$ in. upwards, according to size of cop to be made and the space required for creeling.

SPACE OCCUPIED.

Multiply half the number of spindles in the frame by the space of the spindles, and add 3 ft. 5 in., for gearing, etc. Width of frame 3 ft. 10 in.

IMPROVED REEL

FOR REELING FROM ONE OR TWO COPS OR RING SPINNING
BOBBINS TO EACH HANK, ALSO FROM "CHEESES" MADE
ON PATENT QUICK TRAVERSE GASSING FRAMES, WITH
INSTANTANEOUS STOP MOTION TO EACH END.



This Reel possesses many important advantages and surpasses the ordinary Reel in many ways. It is very firmly built and runs with the utmost steadiness.

The Swift, instead of being in one continuous length and driven from the end as in the ordinary Reel, is divided into four independent sections of ten hanks each, and each section is driven separately in the middle of the Machine by clutch gearing.

The Off-end of each swift is supported by a bracket which is provided with a stud and sliding bush, dispensing with the gate or other appliances for lifting the swift when doffing.

Double Hanks can be reeled, and the Reel is made to knock off at any required length.

Very simple and effective manner of attaching all the ends to the swift at once. This is done by means of a small rod placed upon the traverse plate whilst tying up. After the ends have been cut, they are thrown over this rod which is turned about twice round to secure them, then the rod is attached to the swift which is now ready to be put into operation without having to attach each end separately as in the ordinary Reel. The rod is held in position by a small spring.

Only half-a-minute is required to change from Lea to Cross Reeling, or *vice versa*.

Patent Stop Motion to each end which only stops that section of the swift upon which an end breaks. This motion is so positive and instantaneous in its action that when an end breaks it stops the swift before it can make half a revolution, enabling the end to be pieced up at once, and ensuring each hank to be of the same length. Short leas or hanks, owing to the want of an effective stop motion, have given rise to very serious complaints and even prosecutions, in fact, the grievances have been so strong that since the passing of the Merchandise Marks' Act of 1887 the law directs that all bundles must under penalty, be the correct length and weight as stated on the labels which they bear.

Even with careless Reelers, this stop motion would prevent any appreciable loss of length and would ensure the bundles being of equal length or weight, as the swift upon which an end breaks cannot be put in motion again until the broken end has been pieced up.

The importance of this motion will at once be understood as without it the swift might easily revolve many times before a broken end would be noticed, and after being detected, it would make four or five more revolutions before the Machine could be stopped, which is a very great evil. Furthermore, in the case of other Reels the whole swift has to be stopped, whereas, with the improved Reel, only that section where the end may be broken. This, of course, means that there is a continuous working of 30 out of 40 ends.

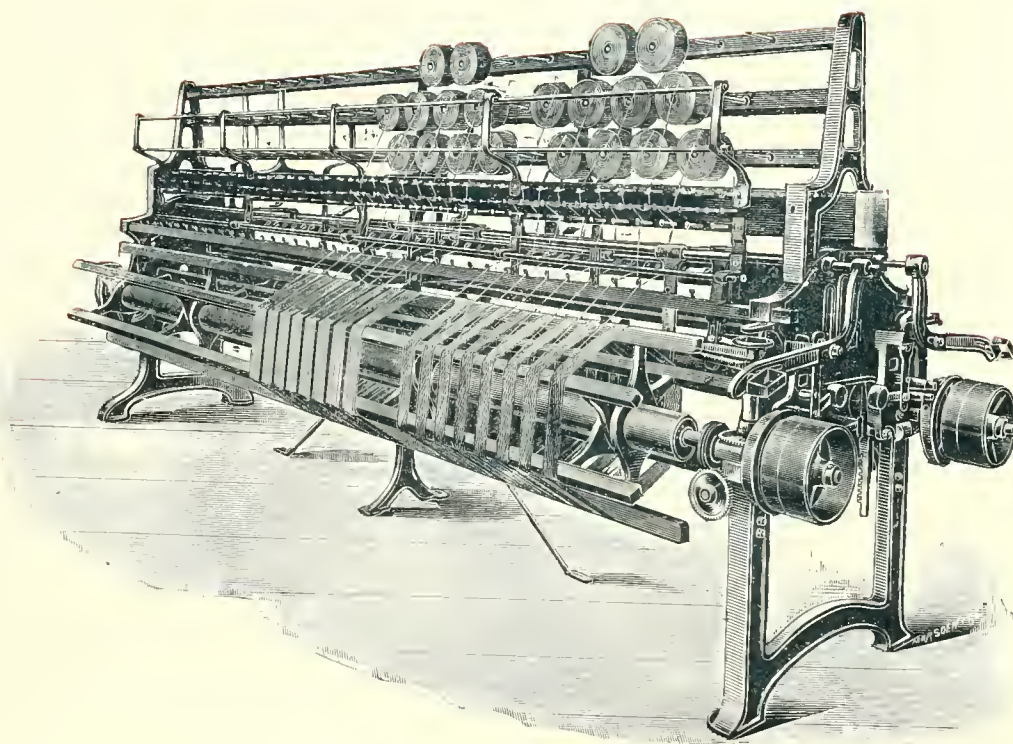
The gain in production, over the ordinary Reel, from this source alone, is remarkable, being as much as 25%.

The Reels are most convenient when arranged and worked in alleys like Throstle Frames or Power Looms, with one reeler and a helper to four swifts, or as an alternative, an expert child may take charge of two swifts, that is, twenty cops, and will produce as much work as an average Reeler would from an ordinary Reel.

Space occupied, 6 ft. 10 in. \times 5 ft. 8 in.

Weights :—Gross, $9\frac{1}{2}$ cwts.; Net, 5 cwts. 1 qr.

Cubic measurement :—57 feet.



IMPROVED REEL FOR REELING "CHEESES" MADE ON PATENT QUICK TRAVERSE
GASSING FRAMES.

IMPROVED REEL

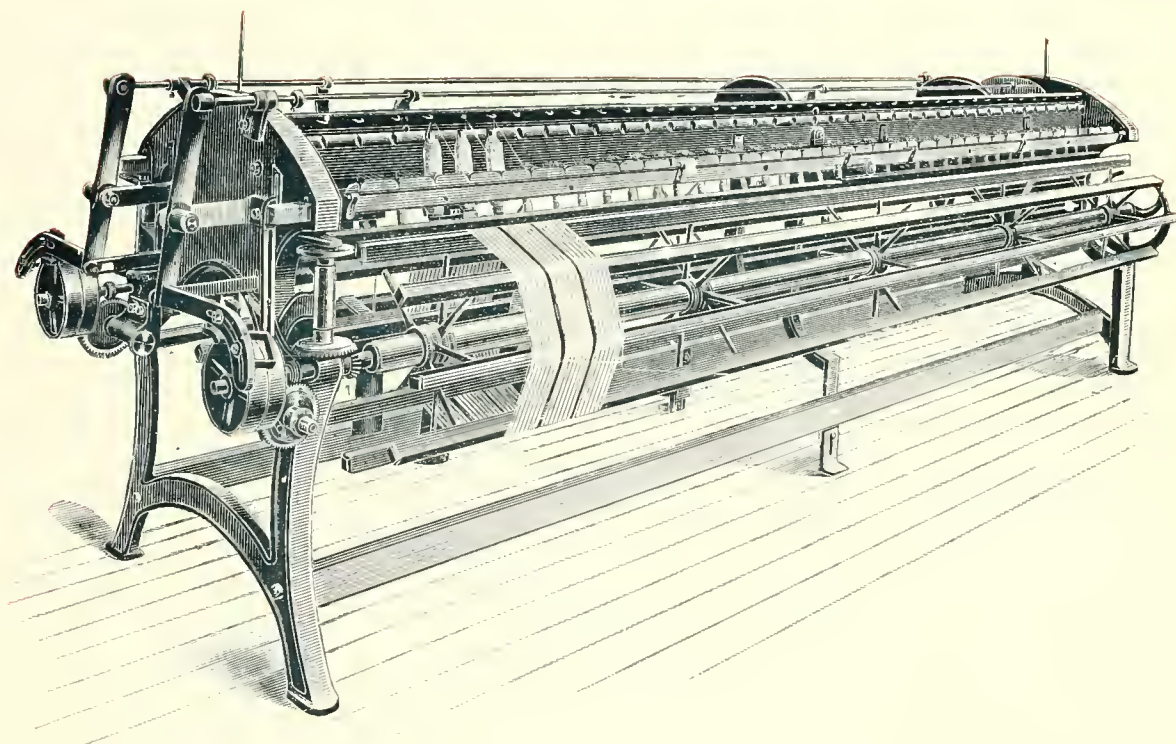
FOR REELING "CHEESES" MADE ON PATENT QUICK TRAVERSE
GASSING FRAMES.

This Reel has been specially constructed for reeling Gassed Yarn into Hanks. It is made with strong iron framing, and the "cheeses" are placed in a special overhead creel, which is provided with three rows of pegs to receive them—two only being used to wind from, the upper row being employed as a reserve. The yarn from the "cheeses" is taken over tension pegs to the traverse rod, the latter being worked in the ordinary manner. The swifts are made with strong tin shafts, perfectly balanced, capable of running at a very high speed; each swift is fitted with an efficient automatic brake. Patent Doffing Motion for taking off the hanks.

The Reel is made to wind 80 hanks, 40 on each side, $3\frac{1}{2}$ in. gauge, with 7 lea motion; crossing motion is also applied when required.

Space occupied:—13 ft. 4 in. \times 4 ft. 0 in.

Weight and cubic measurement of 3 Reels packed together:—Gross, 32 cwts.
Net, 25 cwts. 195 cubic feet.



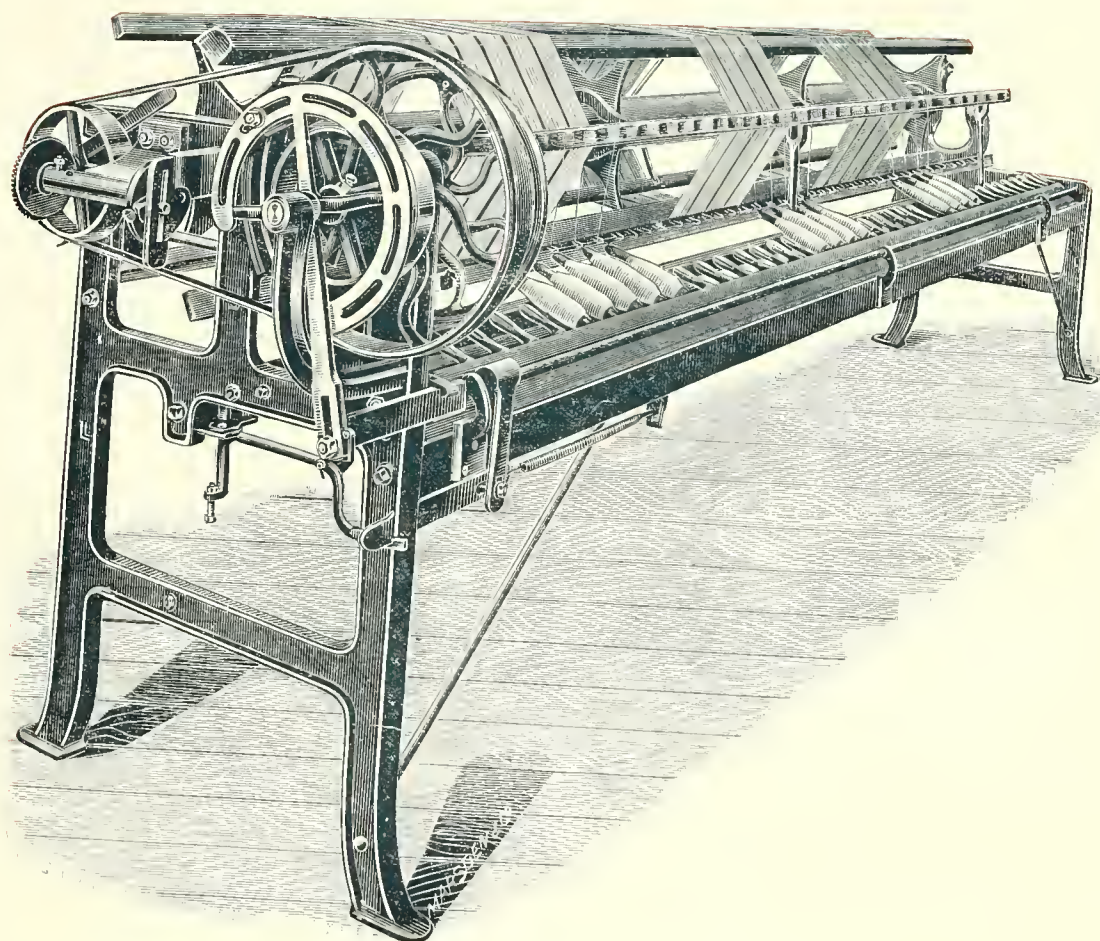
DOUBLE BOBBIN REEL FOR REELING YARN FROM THE END OF RING SPINNING
BOBBINS INTO HANKS.

DOUBLE BOBBIN REEL

FOR REELING YARN FROM THE END OF RING SPINNING
BOBBINS INTO HANKS.

This Reel is made with strong iron framing, from new and improved patterns, to which are fixed stays or rails on each side, giving additional strength and firmness to the Machine. It has a strong wood rail on each side fitted with hinged plates, upon which are fixed split wood pegs for holding the Ring Spinning Bobbins for each swift. The usual size of swift is 54 ins. circumference, and has eight staves, which are made of the best quality of pine; the centres are of Loco. lap-welded wrought-iron tubes, $2\frac{3}{8}$ in. diameter, or Tin Rollers 4 in. diameter, with $1\frac{1}{2}$ in. overlap at the joints, and have cast or malleable iron swivels. It is fitted with an improved swivel lever strap guide, 7 lea and adjustable self-acting knocking-off motions with powerful brake. Crossing Motion can be applied, if required. It has steel shafts throughout, steel guide plates and steel guide wires. Polished bobbin box for full bobbins, and shute for delivering empty bobbins into skips at doffing end of Reel. When required for double or very strong yarns the swifts are made with one stave to drop towards the centre, and the others to close up as usual. Patent Doffing Motion for taking off the hanks.

No. of Hanks.	Gauge.	Space occupied.				Weights and Cubic Measurement.
		Ft.	In.	×	Ft. In.	
60	4	11	9	×	4 0	2 Reels packed together :—
60	$4\frac{1}{2}$	13	0	×	4 0	
80	3	11	9	×	4 0	Gross, 19 cwt.
80	$3\frac{1}{2}$	13	0	×	4 0	Net, 13 cwt.
100	3	14	0	×	4 0	94 cubic feet.



SINGLE REEL FOR REELING YARN FROM THE END OF RING SPINNING BOBBINS
OR COPS INTO HANKS.—CAN BE WORKED BY HAND OR POWER.

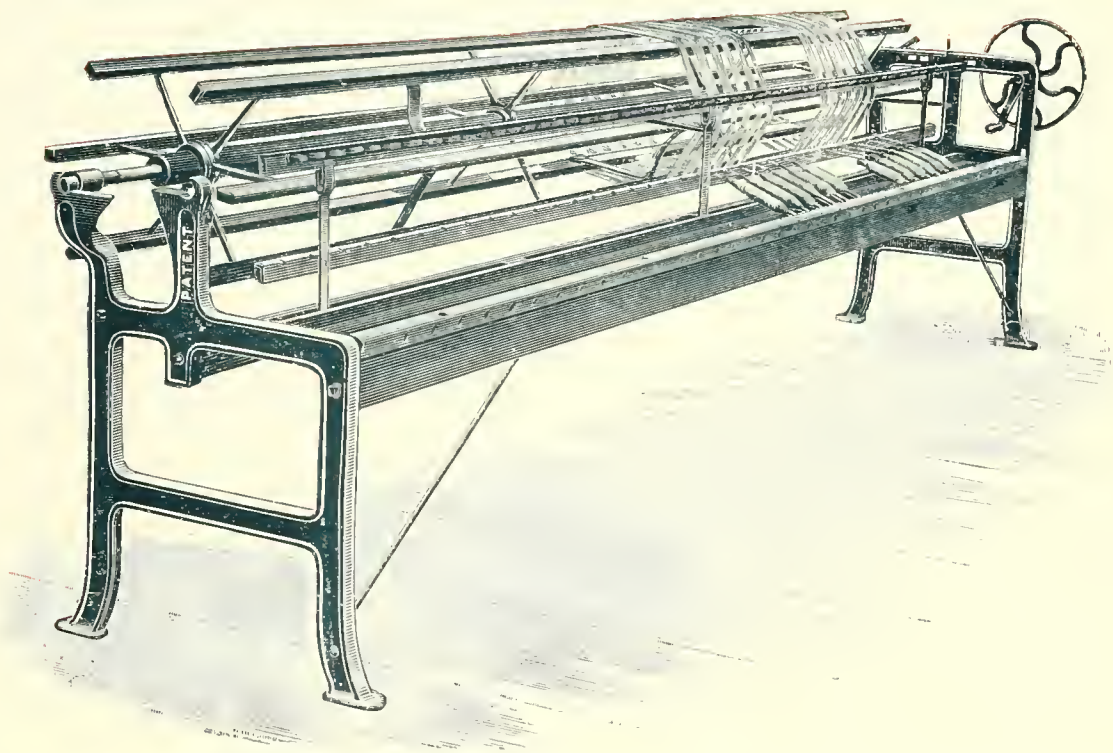
SINGLE REEL

FOR REELING YARN FROM THE END OF RING SPINNING
BOBBINS OR COPS INTO HANKS.

CAN BE WORKED BY HAND OR POWER.

This Reel is made with strong iron framing, from new and improved patterns. If for Cops it is fitted with a wood rail for holding the Cop Skewers ; but if for Ring Spinning Bobbins flexible wood pegs are fixed upon the skewer holder rail for holding the bobbins. The Swift is 54 ins. circumference, and has six staves, which are made of the best quality of pine ; the centres are of Loco. lap-welded wrought-iron tubes, 2 $\frac{3}{8}$ in. diameter, or Tin Rollers 4 in. diameter, with 1 $\frac{1}{2}$ in. overlap at the joints, and have malleable iron or wood swivels. It is fitted with an improved strap guide and powerful automatic brake ; 7 lea and adjustable self-acting knocking-off motions. Crossing Motion can be applied, if required. It has steel shafts throughout, steel guide plates, and steel guide wires. Patent Doffing Motion for taking off the hanks.

No. of Hanks.	Gauge. In.	Space occupied.						Weights and Cubic Measurement.
		Ft.	In.		Ft.	In.		
30	4	11	3	×	3	0		10 Reels packed together :— Gross, 30 cwts. Net, 21 cwts. 193 cubic feet.
30	4 $\frac{1}{2}$	12	6	×	3	0		
40	3	11	3	×	3	0		
40	3 $\frac{1}{2}$	12	6	×	3	0		
50	3	13	6	×	3	0		



SINGLE REEL FOR REELING YARN FROM THE END OF RING SPINNING BOBBINS
OR FROM COPS INTO HANKS—TO WORK BY HAND ONLY.

SINGLE REEL

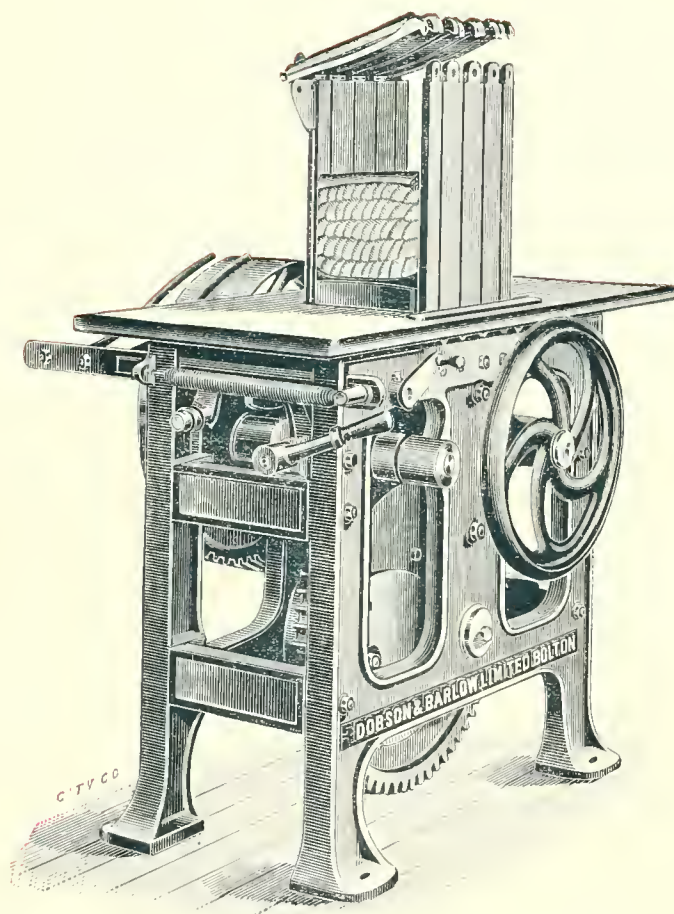
FOR REELING YARN FROM THE END OF RING SPINNING

BOBBINS OR FROM COPS INTO HANKS.

TO WORK BY HAND ONLY.

This Reel is made with strong iron framing, from new and improved patterns. If for Cops it is fitted with a wood rail for holding the cop skewers, but if for Ring Spinning Bobbins flexible wood pegs are fixed upon the skewer holder rail for holding the bobbins. The Swift is 54 ins. circumference, and has six staves, made of the best quality of pine; the centres are of Loco. lap-welded wrought iron tubes, 2½ in. diameter, or Tin Rollers 4 in. diameter, with 1½ in. overlap at the joints, and have malleable iron or wood swivels. It is fitted with 7 lea motion, and Crossing Motion can be applied, if required. It has steel shafts throughout, steel guide plates and steel guide wires. Patent Doffing Motion for taking off the hanks. Brushes for cleaning yarn applied, if required.

No. of Hanks.	Gauge.	Space occupied.				Weights and Cubic Measurement.
		Ft.	In.	×	Ft. In.	
30	4	11	3	×	3 0	10 Reels packed together:— Gross, 30 cwt. Net, 21 cwt. 191 cubic feet.
30	4½	12	6	×	3 0	
40	3	11	3	×	3 0	
40	3½	12	6	×	3 0	
50	3	13	6	×	3 0	



PATENT YARN BUNDLING PRESS WITH AUTOMATIC ARRANGEMENT FOR OPENING
AND CLOSING THE BARS.

PATENT YARN BUNDLING PRESS

WITH AUTOMATIC ARRANGEMENT FOR OPENING AND
CLOSING THE BARS.

This Press is made from most approved patterns, arranged to be driven both by Hand and Power, and will make Bundles 10 lbs. each.

Strong planed cast iron framing, yarn box 12in. long by 8½in. wide, with 4 strings, improved eccentric lifting motion for lifting press table with extra strong gearing, and polished wood table.

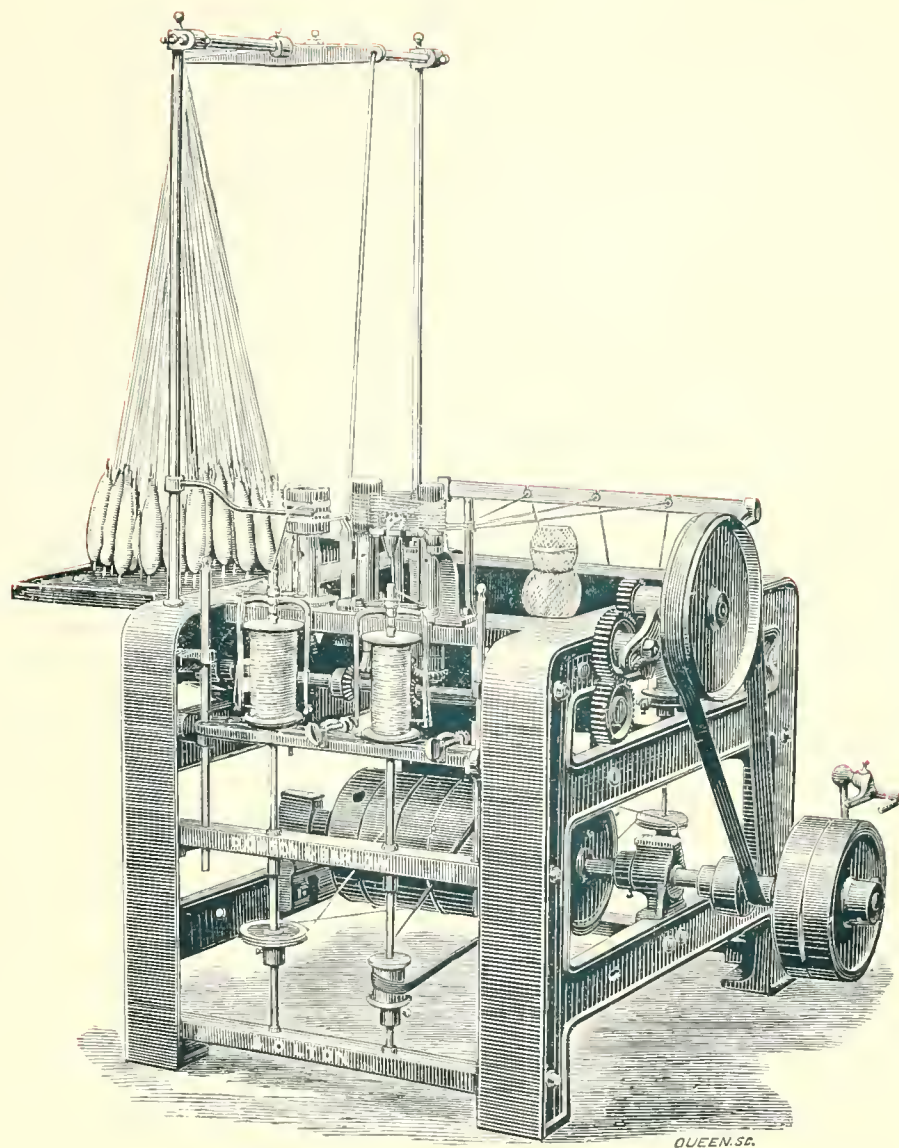
Extra Blocks and Linings to make bundles 5lbs. each are supplied, when required, to fit the press.

Space occupied :—4ft. 0in. × 2ft. 6in.

Weights :—Gross, 13 cwts.; net, 10 cwts.

Cubic measurement :—59 feet.

IMPROVED BAND MAKING MACHINE.



This Machine is strongly built and well finished ; all the jointings are planed to dispense with vibration.

We usually make this Machine with five spindles, namely:—one preparer and one finisher which are on the same side of the Machine, and three intermediate

spindles which are on the other side. The preparing spindle takes the yarn direct from the cops and makes them into a bobbin of one strand; two or three of these bobbins are put on to the intermediate spindles and form two or three strands as required, and are made into one cord on the finishing spindle, as shown in the illustration. We can make these Machines for any number of strands required, and the amount of twist can be varied as desired.

For Mule Spindles, very suitable banding is made from two-fold, or two strands of 25 ends each, from 24^s to 36^s yarn, or a proportionately greater or less number of ends of finer or coarser counts.

For Throstle spindles, very suitable banding is made from two-fold, or two strands of 60 ends each of the above named counts or a proportionately greater or less number of ends of finer or coarser counts.

If three-fold or three-strand banding is preferred, 23 ends of the above-named counts are made into one strand, or a proportionately greater or less number of ends of finer or coarser counts.

The size of the full bobbins made on this Machine is 6 in. \times 4 in.

The Banding is always of one uniform tension, it having the same number of turns put in every inch, and is perfectly even throughout.

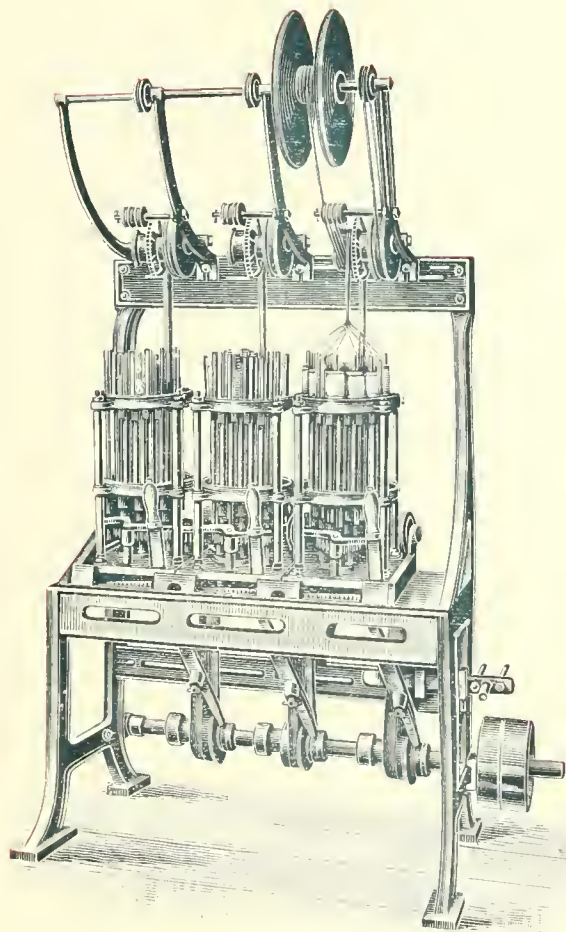
An arrangement is applied for stretching the banding, as it is being made, both in strands and cord. This, of course, is of the utmost importance, as will be readily understood by all users. No slack banding.

Production, per hour, of two strand-banding is about 250 yards; that of three strands 180 yards.

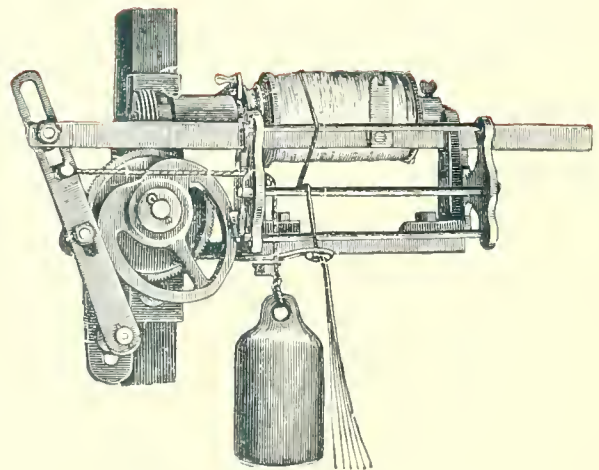
Space occupied by a Machine as illustrated, including creel to hold 60 cops, 5 ft. 0 in. \times 3 ft. 8 in.

Weights :—Gross, 10 cwts. Net, 7 cwts.

Cubic measurement :—76 ft.



3 HEAD TUBULAR BANDING MACHINE.



WINDING ARRANGEMENT.

MACHINES FOR MAKING TUBULAR SPINDLE BANDING.

The illustration on preceding page is that of a 3 head 16 Spindle Tubular Banding Machine for making banding for Ring and Mule Spindles.

These machines are made of various lengths according to the number of heads—each head works entirely independent of the others.

The machine is automatic in its action and requires no special attention—it is so simple that a young girl could manage it.

Instantly a bobbins runs empty the head affected stops whilst the other heads continue to run—thus bad work cannot be made.

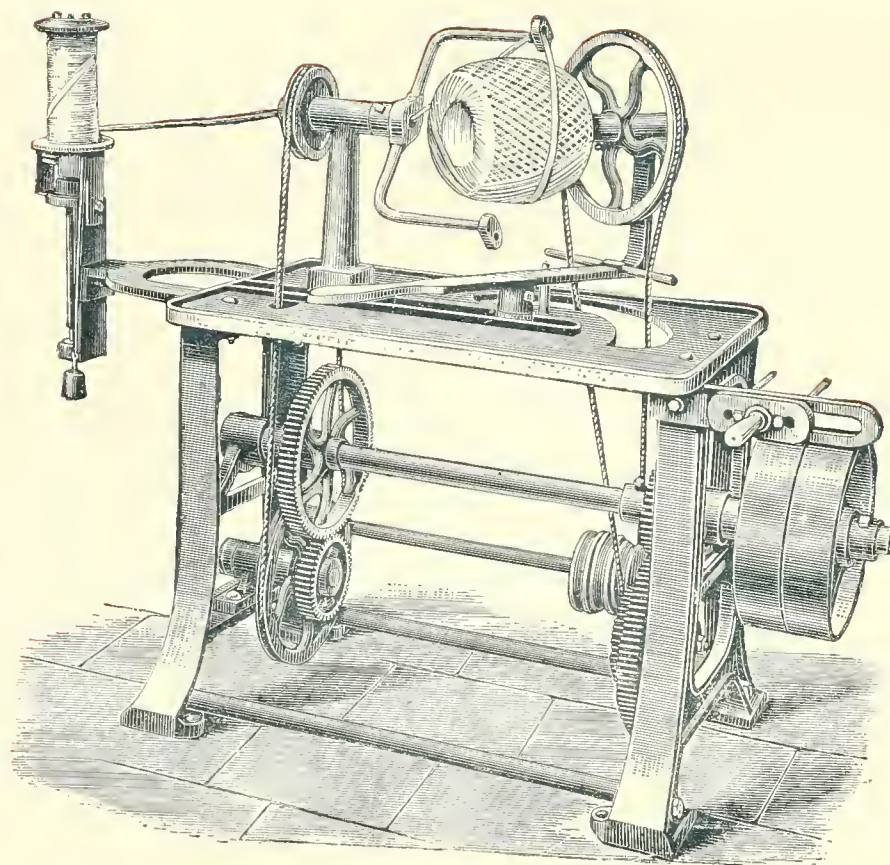
WINDING ARRANGEMENT.

This arrangement is attached to the Banding Machine and driven by it so that the machine winds and doubles at one and the same time, and the person attending to the machine can also superintend the winding. It requires hardly any power to drive it, and can be stopped on the breaking of an end without stopping the machine.

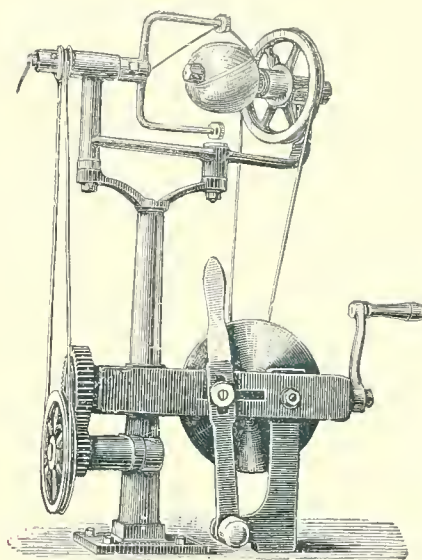
SPACE OCCUPIED, WEIGHTS, &c.

No. of Heads.	Space occupied.				Weights.		Cubic Measurement.
					Gross.	Net.	
	Ft.	In.	Ft.	In.	Cwts.	Cwts.	Feet.
1	2	1	1	1	2	1½	21
2	2	0	2	0	5	4½	30
3	3	0	2	0	7	5	42
6	6	6	2	0	11	8	40

Machines of 1, 2, or 3 heads are packed whole; machines of 6 heads are packed in pieces.



POWER BALLING MACHINE.
"B" SIZE.



HAND BALLING MACHINE.

BALLING MACHINES.

These Machines are made of various sizes to make Balls from 1 oz. to 1½ cwt., and are made to work by Hand or Power.

The Machines are very strong, and are well finished ; when required they are provided with a Spindle, as shown in illustration of Power Balling Machine on previous page, for balling off any size bobbins with a Special Drag Motion to keep an equal tension on the cord or twine being wound. These Machines—except the Hand Machines—have no friction plate, but have instead a special changing arrangement for covering the different sizes of balls. This arrangement is worked by gearing, and is very simple—it obviates all slipping.

SPACE OCCUPIED, WEIGHTS, &c.

	Space occupied.				Weights.		Cubic Measurement.
					Gross.	Net.	
	Ft.	In.	Ft.	In.	Cwts.	Cwts.	Feet.
"B" Size.	2	4 ×	2	2	3	2¼	10
"C" "	3	2 ×	2	0	3½	2½	13
"D" "	3	6 ×	3	0	6	4	21
Hand Machine.	1	9 ×	1	1	1¼	0¾	4

We are also Makers of the most modern and efficient type of:—

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HARD WASTE BREAKERS, with from one to six Cylinders, with or without Soaper.

CARDING ENGINES, for Waste and Vigonia Yarn, with Lattice Feeder or Hopper Feeder; and with Coilers, Condensor, or any other kind of delivery arrangement.

BILLEYS for Waste and Vigonia Yarn.

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ROLLER ENDING MACHINES.

PREPARING OR CALENDERING MACHINES, AND

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BRUSHES.

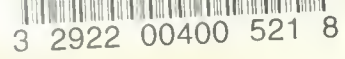
Owing to the great difficulty both ourselves and our friends have experienced in obtaining really good Brushes for Carding Engines, Combers, &c., we decided some time ago to overcome this objection by establishing a department in our works, specially for the manufacture of all kinds of Brushes for Cotton Mill purposes. The services of thoroughly experienced men are employed, and every attention is paid to the selection of the Bristles and other material, none but the very best procurable being used.

We also make Wire Stripping and Burnishing Brushes for Carding Engines.



G. S. HEATON & Co., VICTORIA WORKS, BOLTON.



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